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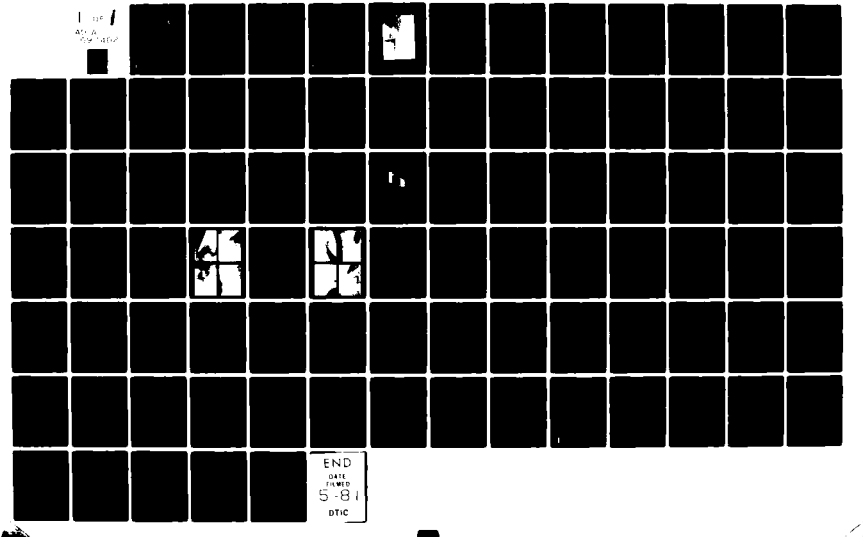

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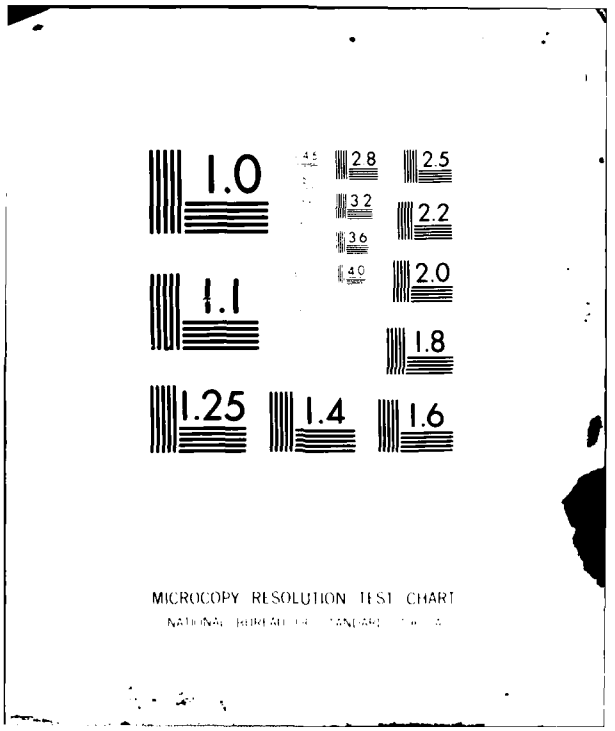
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DELAWARE RIVER BASIN
BUSH KILL CREEK, PIKE COUNTY, Pennsylvania

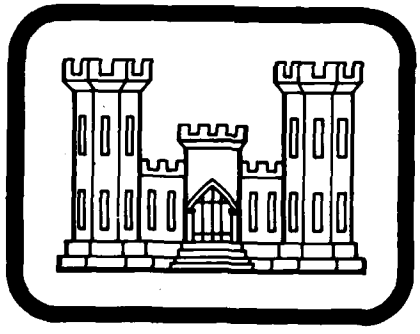
PENNSYLVANIA

PECKS POND DAM

NDI I.D. NO. PA-00754,
PENNDER I.D. NO. 52-15),

~~COMMONWEALTH OF PENNSYLVANIA~~

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



PREPARED FOR

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

(15) DACW31-81-C-0015

PREPARED BY

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MONROEVILLE, PENNSYLVANIA 15146

(11) JANUARY 1981 (12) 95

PREFACE

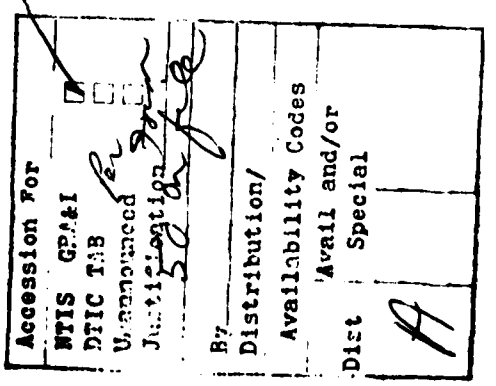
This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the Spillway Design Flood is based on the estimated Probable Maximum Flood (greatest reasonably possible storm runoff) for the region, or fractions thereof. The Spillway Design Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

Breach analyses are performed, when necessary, to provide data to assess the potential for downstream damage and possible loss of life. The results are based on specific theoretical scenarios peculiar to the analysis of a particular dam and are not applicable to other related studies such as those conducted under the Federal Flood Insurance Program.



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ABSTRACT

Pecks Pond Dam: NDI I.D. No. PA-00754

Owner:	Commonwealth of Pennsylvania
State Located:	Pennsylvania (PennDER I.D. No. 52-15)
County Located:	Pike
Stream:	Bush Kill Creek
Inspection Date:	14 October 1980
Inspection Team:	GAI Consultants, Inc. 570 Beatty Road Monroeville, Pennsylvania 15146

Based on a visual inspection, operational history, and hydrologic and hydraulic analysis, the dam is considered to be in good condition.

The size classification of the facility is intermediate and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for the facility is the PMF (Probable Maximum Flood). Results of the hydrologic and hydraulic analysis indicate the facility will pass and/or store only 13 percent of the PMF prior to embankment overtopping. A breach analysis indicates that failure under less than 1/2 PMF conditions could lead to increased downstream damage and potential for loss of life. Thus, based on screening criteria provided in the recommended guidelines, the spillway is considered to be seriously inadequate and the facility unsafe, non-emergency.

It is recommended that the owner immediately:

a. Retain the services of a registered professional engineer experienced in the hydrology and hydraulics of dams to further assess the adequacy of the spillway and prepare recommendations for remedial measures deemed necessary to make the facility hydraulically adequate.

b. Repair the minor eroded area behind the right spillway wingwall and provide protection against further erosion damage.

Pecks Pond Dam: NDI I.D. No. PA-00754

c. Develop formal manuals of maintenance and operation for the facility. The manuals should include provisions for regular routine maintenance of the small earth dike located along the right abutment and control of vegetation immediately below the downstream embankment toe.

d. Develop a formal warning system to notify downstream residents should hazardous conditions develop. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

GAI Consultants, Inc.

Bernard M. Mihalcin

Bernard M. Mihalcin, P.E.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
BERNARD M. MIHALCIN
ENGINEER
20371-E

Date 28 January 1981

Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date 4 March 81

OVERVIEW PHOTOGRAPH

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
PECKS POND DAM
NDI# PA-00754, PENNDER# 52-15

SECTION 1
GENERAL INFORMATION

1.0 Authority.

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

1.1 Purpose.

The purpose is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Pecks Pond Dam is an earth, concrete and masonry embankment approximately 7 feet high and 170 feet long, including spillway. The facility is provided with a trapezoidal shaped, concrete and masonry chute channel spillway founded on rock at the left abutment. The outlet works consists of a 36-inch diameter bituminous coated corrugated metal pipe (BCCMP) connected to a concrete box culvert that discharges at the downstream embankment toe. Flow through the outlet is regulated by two sets of wooden stop logs set within a concrete vault near the center of the embankment.

b. Location. Pecks Pond Dam is located on Bush Kill Creek in Porter Township, Pike County, Pennsylvania. The facility is situated within 1000 feet of Pennsylvania Route 402, about 5 miles south of Interstate 84 and about 25 miles north of the city of East Stroudsburg, Pennsylvania. The dam and reservoir are contained within the Pecks Pond, Pennsylvania 7.5 minute U.S.G.S. topographic quadrangle (see Figure 1, Appendix E). The coordinates of the dam are N41°16.9' and W75°5.3'.

c. Size Classification. Intermediate (7 feet high, 2140 acre-feet storage capacity at top of dam).

d. Hazard Classification. High (see Section 3.1.e).

e. Ownership. Commonwealth of Pennsylvania
Department of Environmental Resources
Bureau of Forestry

f. Purpose. Recreation.

g. Historical Data. Information contained in PennDER files indicates that Pecks Pond Dam was originally constructed around 1906 by the Pennsylvania State Forest Commission. The facility was designed by Simon B. Elliot, a member of the Commission, and was built approximately 25 feet downstream of an old timber dam that dated back to 1865.

Significant seepage problems resulted in extensive repairs to the facility in 1934. Modifications were designed by B.A. Knight of the Pennsylvania Department of Forests and Waters (PennDER predecessors). These modifications, as seen in Figure 2, included the construction of a concrete cutoff wall in the center of the embankment and a new spillway at the left abutment. In addition, a small earth dike was constructed along the right abutment in order to increase the available freeboard. Prior to 1934, overflows along this low area were commonplace during heavy storms.

The need for a means of regulating the pool level became apparent shortly after the 1934 modifications were completed. In 1936-37, an outlet conduit (box culvert) and a stop log mechanism were designed (see Figure 3), but only partially constructed. Correspondence indicates that the inlet side was extended only 8 feet upstream from the stop log structure as hard rock was encountered that would have required excavation by blasting. The inlet end of the box culvert was capped with a thin concrete slab that had to be excavated and removed to affect drawdown. In 1967, an 18-foot section of 36-inch diameter BCCMP was added to the box culvert, extending the inlet to the upstream toe of the dam, and making it accessible without excavating. A steel plate reportedly covers the pipe inlet and is removed by diver when drawdown is desired.

The history of Pecks Pond Dam is well documented in PennDER files. State inspection reports are available for the years 1919, 1930, 1931 and 1935. Monthly inspection checklists are available between 1957 and 1959, while bi-annual reports are on file from 1959 through 1970. Since 1971, the facility has been inspected by the state on an annual basis. No significant deficiencies have been recorded over the last 10 years.

1.3 Pertinent Data.

a. Drainage Area (square miles). 9.2

b. Discharge at Dam Site.

Discharge Capacity of Outlet Conduit - Discharge curves are not available.

Discharge Capacity of Spillway at Maximum Pool = 420 cfs (see Appendix D, Sheet 11).

c. Elevations (feet above mean sea level). The following elevations were obtained through field measurements based on the elevation of normal pool at 1360.0 feet as indicated in Figure 1 (see Appendix D, Sheets 1 and 2).

Top of Dam	1362.3 (field). 1361.9 (design).
Maximum Design Pool	Not known.
Maximum Pool of Record	Not known.
Normal Pool	1360.0. (assumed datum).
Spillway Crest	1360.0.
Upstream Inlet Invert	Not known.
Downstream Outlet Invert	1355.1 (field). 1354.6 (design).
Streambed at Dam Centerline	1352.0. (estimated).
Low Top of Right Abutment Dike	1361.8 (field).

d. Reservoir Length (feet).

Top of Dam	12,000
Normal Pool	10,800

e. Storage (acre-feet).

Top of Dam	2140
Normal Pool	1100

f. Reservoir Surface (acres).

Top of Dam	490
Normal Pool	420

g. Dam.

Type	Earth, concrete and masonry.
Length	170 feet (excluding spillway at left abutment and adjacent dike at right abutment).
Height	7 feet (field measured; crest to downstream outlet invert).
Top Width	25 feet (field measured; shoreline to downstream edge of embankment crest. Shoreline varies slightly due to minor erosion).

Upstream Slope	Approximately 3H:1V.
Downstream Slope	3H:5V (hand-placed rock wall).
Zoning	Concrete corewall is flanked on downstream side by hand-placed rock and on immediate upstream side by "selected backfill material". Original embankment earth material completes the cross-section of the upstream slope (see Figure 2).
Impervious Core and Cutoff	15-inch wide concrete cutoff wall backed by selected fill extends the entire length of the main embankment.
Grout Curtain	None indicated.

h. Diversion Canal and Regulating Tunnels. None.

i. Spillway.

Type	Trapezoidal shaped, concrete and masonry chute channel cut in rock at the left abutment.
Crest Elevation	1360.0.
Crest Length	30 feet.

j. Outlet Conduit.

Type	36-inch diameter BCCMP discharges into 3-foot square concrete box culvert (see Figure 3).
Length	18 feet (36-inch diameter BCCMP). 18 feet (concrete box culvert).
Closure and Regulating Facilities	Flows through the outlet are regulated via two sets of wooden stop logs set

	parallel in grooves within a concrete vault located near the center of the embankment. A steel plate reportedly caps the inlet end of the 36-inch diameter pipe.
Access	Stop logs are accessible from the embankment crest.

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Design Data Availability and Sources. No formal design reports or calculations are available concerning any aspect of this facility. PennDER files contain several drawings and sketches the most significant of which have been included in Appendix E of this report (see Figures 2 and 3). These files also contain extensive correspondence dating back to 1919 along with dated photographs and frequent state inspection reports.

b. Design Features.

1. Embankment. Design features of the embankment are presented in Figure 2. As shown, the basic embankment cross section consists of an earthen upstream section, a central concrete corewall and a downstream section composed of hand-placed rock. The embankment was originally constructed without the concrete corewall. It was added in 1934 as part of extensive modifications that were intended to reduce or eliminate substantial seepage that had been discharging along the downstream embankment toe. The corewall was reportedly carried to "good foundation" material; however, whether or not it was extended to rock is not clear. The downstream embankment face is set at a 3H:5V slope. Although Figure 2 gives the impression of masonry along the downstream face, no mortar or bonding material was in evidence except for that associated with the right spillway wingwall. The crest of the embankment was measured to be about 25 feet wide, and consisted of a 4-foot wide concrete cap at the downstream edge and a 21-foot wide flat to slightly sloped section of the upstream earth portion of the embankment. The upstream embankment face was apparently designed without erosion protection at a slope of about 3H:1V.

A small earth dike, two feet high, was constructed in 1934 across a low area adjacent the right abutment of the embankment. The structure was measured by the inspection team to be about 130 feet long; however, its features and limits are difficult to clearly discern. The structure apparently consists of homogeneous earth with no notable design features.

2. Appurtenant Structures.

a) Spillway. Design features of the spillway are presented in Figure 2. As indicated, the spillway is a trapezoidal shaped, concrete and masonry chute channel cut into rock at the left abutment. Flows are controlled by a small, concrete, flat-crested weir.

b) Outlet Conduit. The outlet conduit design is partially presented in Figure 3. The outlet consists of an 18-foot long section of 36-inch diameter BCCMP that discharges into an 18-foot long concrete box culvert. Control is provided by two sets of stop logs set in a concrete vault accessible from the embankment crest. In addition, a steel plate covers the inlet end of the conduit and must be manually removed by diver in order for flow to enter the conduit unobstructed. Figure 3 depicts this general scheme showing the approximate correct location of the stop logs and BCCMP inlet pipe.

c) Specific Design Data and Criteria. No specific design data or information relative to design procedures are available other than the general notes contained in the available drawings.

2.2 Construction Records.

No formal records or correspondence pertaining to the circa 1906 construction of the original facility are available. There are, however, photographs, inspection reports and miscellaneous correspondence which partially document the major modifications that occurred in 1934, 1937, and 1967.

2.3 Operational Records.

No records of the day-to-day operation of the facility are available.

2.4 Other Investigations.

No formal investigations other than frequent state inspections have been performed on this facility subsequent to its construction. Significant modifications were made to the structure in 1934, 1937, and 1967; however, aside from drawings contained in PennDER files, no other data are available.

2.5 Evaluation.

The available data are considered sufficient to make a reasonable Phase I evaluation of the facility.

SECTION 3
VISUAL INSPECTION

3.1 Observations.

a. General. The overall appearance of the facility suggests that the dam and its appurtenances are in good condition.

b. Embankment. Observations made during the visual inspection indicate the embankment is in good condition (see Photograph 1). No evidence of seepage through the downstream embankment face, sloughing, excessive settlement, animal burrows, or signs of major maintenance neglect were observed. Minor erosion along the upstream embankment face and behind the upstream portion of the right spillway wingwall were noted, but, are not considered significant at this time. Provisions for erosion protection along the upstream embankment slope were apparently not included in the original design or in the design for the 1934 modifications. Minor cracks observed along the concrete cap that partially covers the crest were recently filled and adequately repaired. Some of the dense brush located along the downstream embankment toe had to be cut back by the inspection team in order to achieve a clear view of this area (see Photographs 2 and 3). It is suggested that control of this excess vegetation be specifically included as part of future routine maintenance.

The adjacent earth dike at the right abutment appears to be maintained only in that it serves as a footpath to the adjoining woods (see Photograph 4). Field measurements indicate settlement near the embankment-dike junction on the order of six inches. Maintenance of the dike is not as critical as is maintenance of the main embankment. It is, however, recommended that this minor appurtenance not be neglected in that it does serve to protect the embankment during high pools preventing water from flowing along the downstream embankment toe, eroding support and ultimately threatening the integrity of the structure.

c. Appurtenant Structures.

1. Spillway. The visual inspection revealed that the spillway is in good condition (see Photographs 5 and 6). Recently repaired cracks are in evidence along the right wingwall which also displayed some minor erosion along its upstream embankment side.

2. Outlet Conduit. The outlet conduit is considered to be in good condition. The interior of the concrete box culvert was inspected from the outlet end to the stop logs, with some minor spalling observed (see Photograph 8). New stop logs have been installed and the vault structure was generally observed to be in good condition (see Photograph 7).

d. Reservoir Area. The general area surrounding Pecks Pond is comprised of gentle to moderate slopes that are heavily wooded. The pond floods a flat, swampy area which extends beyond its northern and eastern shores. The southern and western edges of the lake are lined with state owned seasonal dwellings that are annually leased to the public.

e. Downstream Channel. The channel immediately downstream from Pecks Pond Dam is characterized as a rock lined streambed, 30 to 50 feet wide, set between moderate to steep, heavily wooded slopes. Between 500 and 1,500 feet downstream from the dam, six to seven seasonal dwellings are located about four feet above the streambed. It is estimated that, during the peak season and on weekends, as many as 20 to 30 lives could be lost and significant damage incurred in this area alone as the result of an embankment breach. Consequently, the hazard classification of the facility is considered to be high.

3.2 Evaluation.

The overall condition of the facility is considered to be good. Some minor deficiencies were noted including; 1) minor erosion along the upstream embankment slope and behind the upstream right spillway wingwall, 2) minor spalling associated with the outlet conduit, 3) lack of adequate maintenance of the small earth dike along the right abutment and, 4) excess vegetation encroaching upon the downstream embankment toe.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure.

Pecks Pond Dam is essentially a self-regulating facility. Excess inflows are automatically discharged through the emergency spillway. Under normal operating conditions, the outlet conduit stop logs are in place and the inlet end of the pond drain is capped. No formal operations manual is presently available.

4.2 Maintenance of Dam.

The facility is maintained on an unscheduled basis by PennDER, Bureau of Forestry personnel. Major maintenance is usually performed in accordance with recommendations presented by state inspectors from the PennDER, Bureau of Operations, who are charged with inspecting the facility annually. No formal maintenance manual is presently available.

4.3 Maintenance of Operating Facilities.

See Section 4.2 above.

4.4 Warning System.

No formal warning system is presently in effect.

4.5 Evaluation.

No formal operations or maintenance manuals are presently available for this facility although a program of regular inspection and informal maintenance has been established. Discussions with a state representative indicated that the PennDER, Bureau of Design, is prepared to develop such manuals including a formal warning system.

SECTION 5
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

No formal design reports, calculations, or miscellaneous design data are available for this facility.

5.2 Experience Data.

Daily records of reservoir levels and/or spillway discharges are not available. The general appearance of the facility suggests adequate past performance. Correspondence indicates that the facility has historically been overtopped in the vicinity of the low dike adjacent to the right abutment.

5.3 Visual Observations.

On the date of inspection, no conditions were observed that would indicate the spillway could not perform satisfactorily during a flood event within the limits of its design capacity.

5.4 Method of Analysis.

The facility has been analyzed in accordance with the procedures and guidelines established by the U. S. Army, Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations. The analysis has been performed utilizing a modified version of the HEC-1 program developed by the U. S. Army, Corps of Engineers, Hydrologic Engineering Center, Davis, California. Anaytical capabilities of the program are briefly outlined in the preface contained in Appendix D.

5.5 Summary of Analysis.

a. Spillway Design Flood (SDF). In accordance with procedures and guidelines contained in the National Guidelines for Safety Inspection of Dams for Phase I investigations, the Spillway Design Flood (SDF) for Pecks Pond Dam is the PMF (Probable Maximum Flood). This classification is based on the relative size of the dam (intermediate), and the potential hazard of dam failure to downstream developments (high).

b. Results of Analysis. Pecks Pond Dam was analyzed under normal operating conditions. That is, the reservoir was initially at its normal pool or spillway elevation of approximately 1360.0 feet, with the spillway weir discharging freely. The

outlet conduit was assumed to be nonfunctional for the purpose of analysis, since the flow capacity of the conduit is such that it would not significantly increase the total discharge capabilities of the dam and reservoir. The spillway consists of a rock lined, trapezoidal shaped, concrete and masonry chute channel with discharges controlled by a concrete flat-crested weir. All pertinent engineering calculations relative to the evaluation of Pecks Pond Dam are provided in Appendix D.

Overtopping analysis (using the modified HEC-1 computer program) indicated that the discharge/storage capacity of Pecks Pond Dam can accommodate only about 13 percent of the PMF (SDF) prior to embankment overtopping. Under PMF conditions, the dam was inundated for about 26 hours, by depths of up to 4.0 feet. Under 1/2 PMF conditions, the dam was overtopped for about 22 hours, with a maximum depth of about 2.3 feet (Appendix D, Summary Input/Output Sheets, Sheet E). Since the SDF for Pecks Pond Dam is the PMF, it can be concluded that the dam has a high potential for overtopping, and thus, for breaching under floods of less than SDF magnitude.

As Pecks Pond Dam cannot safely accommodate a flood of at least 1/2 PMF magnitude, the possibility of embankment failure under floods of less than 1/2 PMF intensity was investigated (in accordance with Corps directive ETL-1110-2-234). Several possible alternatives were examined, since it is difficult, if not impossible, to determine exactly how or if a specific dam will fail. The major concern of the breaching analysis is with the impact of the various breach discharges on increasing downstream water surface elevations above those to be expected if breaching did not occur. It was assumed in the routing of the outflows downstream that the streambed was initially dry.

Failure of the dam was assumed to commence upon overtopping. This assumption minimizes the base stream flow in the downstream channel and, thus, simulates the least severe downstream conditions that could occur prior to dam failure. It is noted that, because of the existence of its concrete cap and corewall, Pecks Pond Dam could likely sustain some depth of overtopping prior to breaching. However, such conditions would tend to increase the base stream flow in the downstream channel and create an even more severe scenario.

Three breach models were analyzed for Pecks Pond Dam. The breach sections chosen were considered to be the maximum probable failure section, an average possible failure section, and the minimum probable failure section. The failure time (total time for breach section to reach its final dimensions) for both the maximum and average sections was 1-hour, while that for the minimum section was 0.5 hours (Appendix D, Sheet 13).

The peak breach outflows (resulting from 0.15 PMF conditions) ranged from about 1990 cfs (cubic feet per second) for the minimum section failure scheme to about 7,420 cfs for the maximum

section model. The peak outflow resulting from the average section breach model was about 3,990 cfs, as compared to the non-breach 0.15 PMF peak outflow of approximately 570 cfs (Summary Input/Output Sheets, Sheets I and E).

The principal center of damage investigated is located along the banks of Bush Kill Creek, just upstream from the Route 402 bridge (see Figure 1, Sections 2 and 3). Within the reach, the 0.15 PMF non-breach outflow remained within the banks of the stream, and thus, below the damage levels of the nearby dwellings. At Section 2, the peak water surface elevation resulting from the maximum section breach scheme was about 6.4 feet above the non-breach level, and about 2.0 feet above the damage level of the nearby residence. At Section 3, the increase in water level resulting from the maximum section breach model was about 5.9 feet above the non-breach level, and was about 2.9 feet above the damage level of the surrounding houses (Appendix D, Sheet 15).

It must also be noted that under 1/2 PMF non-breach conditions, the peak water surface elevations were close to the damage levels of the dwellings within the reach. Therefore, should the dam fail under 1/2 PMF conditions, there would most likely be a significant rise in the water level, and thus, significant damage at the downstream residences.

The consequences of dam failure can better be envisioned if not only the increase in the height of the floodwave is considered, but also the great increase in momentum of the larger and probably swifter moving volume of water. In addition, the possibility of a near instantaneous failure due to the collapse of the concrete corewall was not considered in this analysis, although such a failure is possible and would most likely result in higher downstream water surface elevations. Therefore, the failure of Pecks Pond Dam would most likely lead to increased property damage and possibly loss of life in the downstream region.

5.6 Spillway Adequacy.

As presented previously, Pecks Pond Dam can accommodate only about 13 percent of the PMF (SDF) prior to embankment overtopping. It has been shown that should a 0.15 PMF or larger event occur, the dam would be overtopped and could possibly fail, resulting in property damage and possibly loss of life in the downstream region. Therefore, the spillway is considered to be seriously inadequate.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. Based on visual observations, the embankment appears to be in good structural condition. Erosion observed along the upstream embankment face and behind the upstream portion of the right spillway wingwall was the only noteworthy deficiency in evidence and is considered minor. However, the damaged area behind the wingwall should be repaired and erosion protection provided.

b. Appurtenant Structures.

1. Spillway. The spillway appears to be structurally well designed, firmly founded in rock and currently in good condition. Other than the previously mentioned minor erosion behind the upstream portion of the right spillway wingwall, no significant deficiencies were observed.

2. Outlet Conduit. The outlet conduit appears to be in good structural condition. Minor concrete spalling at its downstream end was noted, but, is not considered to be significant at this time.

6.2 Design and Construction Techniques.

No information is available that details the methods of design and/or construction of the original facility or its modifications in 1934, 1937, or 1967.

6.3 Past Performance.

There are no records documenting any events during which the present facility has not adequately functioned.

6.4 Seismic Stability.

The dam is located in Seismic Zone No. 1 and may be subject to minor earthquake induced dynamic forces. As the facility appears to be well constructed and sufficiently stable, it is believed that it can withstand the expected dynamic forces; however, no calculations and/or investigations were performed to confirm this belief.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The results of this investigation indicate the facility is in good condition.

The size classification of the facility is intermediate and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for the facility is the PMF (Probable Maximum Flood). Results of the hydrologic and hydraulic analysis indicate the facility will pass and/or store only 13 percent of the PMF prior to embankment overtopping. A breach analysis indicates that failure under less than 1/2 PMF conditions could lead to increased downstream damage and potential for loss of life. Thus, based on screening criteria provided in the recommended guidelines, the spillway is considered to be seriously inadequate and the facility unsafe, non-emergency.

b. Adequacy of Information. The available data are considered sufficient to make a reasonable Phase I assessment of the facility.

c. Urgency. The recommendations listed below should be implemented immediately.

d. Necessity for Additional Investigations. Additional hydrologic/hydraulic investigations are currently deemed necessary as stated below.

7.2 Recommendations/Remedial Measures.

It is recommended that the owner immediately:

a. Retain the services of a registered professional engineer experienced in the hydrology and hydraulics of dams to further assess the adequacy of the spillway and prepare recommendations for remedial measures deemed necessary to make the facility hydraulically adequate.

b. Repair the minor eroded area behind the right spillway wingwall and provide protection against future erosion damage.

c. Develop formal manuals of maintenance and operation for the facility. The manuals should include provisions for the routine regular maintenance of the small earth dike located along the right abutment and control of vegetation immediately below the downstream embankment toe.

d. Develop a formal warning system to notify downstream residents should hazardous conditions develop. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

APPENDIX A

VISUAL INSPECTION CHECKLIST AND FIELD SKETCHES

CHECK LIST
VISUAL INSPECTION
PHASE 1

NAME OF DAM Pecks Pond Dam STATE Pennsylvania COUNTY Pike

NDI # PA — 00754 PENNDER # 52-15

TYPE OF DAM Earth, Concrete and Masonry SIZE Intermediate HAZARD CATEGORY High

DATE(S) INSPECTION 14 October 1980 and 14 November 1980 WEATHER Windy and Cold TEMPERATURE 40° @ 10:00 a.m.

POOL ELEVATION AT TIME OF INSPECTION 1359.6 feet M.S.L.

TAILWATER AT TIME OF INSPECTION N/A M.S.L.

INSPECTION PERSONNEL	OWNER REPRESENTATIVES	*OTHERS*
B. M. Mihalcin	None	James A. Griffiths - PennDER
D. J. Spaeder		
D. L. Bonk		
K. H. Khilji		

RECORDED BY D. L. Bonk

EMBANKMENT

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00754
SURFACE CRACKS	None observed in the earth portion of the embankment. Evidence of cracks in the concrete cap atop the crest was observed; however, the cracks have recently been repaired and filled.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Minor erosion as evidenced by a bare, unvegetated shoreline was observed along the upstream embankment face. Minor erosion was also observed behind the right spillway wingwall.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical - good. Horizontal - good.
RIPRAP FAILURES	None. The upstream embankment face appears to be unprotected.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The embankment abuts rock at its left or spillway end. The right end is connected to a small dike about 130 feet long with a maximum height of 2 feet. The dike apparently provides freeboard to a low area right of the main dam.

EMBANKMENT

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA- 00754
DAMP AREAS IRREGULAR VEGETATION (LUSH OR DEAD PLANTS)	The area beyond the downstream toe of the dam is covered with high brush and several large trees which should be trimmed on a regular basis.
ANY NOTICEABLE SEEPAGE	None observed.
STAFF GAGE AND RECORDER	None observed.
DRAINS	None observed.

OUTLET WORKS

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00754
INTAKE STRUCTURE	Submerged, not observed. Intake reportedly covered with steel plate.
OUTLET CONDUIT (CRACKING AND SPALLING OF CONCRETE SURFACES)	Concrete box culvert in good condition. Some minor spalling observed at downstream end.
OUTLET STRUCTURE	Flow through the outlet is regulated via stop logs located in a concrete vault within the embankment that is accessible from atop the embankment crest.
OUTLET CHANNEL	Discharges into rock lined spillway channel about 30 feet below embankment.
GATE(S) AND OPERATIONAL EQUIPMENT	Wooden stop logs accessible from the embankment crest.

EMERGENCY SPILLWAY

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00754
TYPE AND CONDITION	Trapezoidal shaped, concrete and masonry chute channel spillway in good condition.
APPROACH CHANNEL	Shallow, rock lined channel approximately 22 feet long.
SPILLWAY CHANNEL AND SIDEWALLS	Right wingwall is constructed of concrete and masonry currently in good condition. Recent repairs are evident. Spillway weir and channel appear to be constructed with hand placed masonry that has been somewhat covered with concrete. Left side of spillway abuts rock. Some minor erosion behind the right spillway wingwall was observed.
STILLING BASIN PLUNGE POOL	None.
DISCHARGE CHANNEL	Channel cut in rock immediately below spillway weir transforms into a smaller stream lined with loose boulders about 50 to 100 feet beyond the embankment.
BRIDGE AND PIERS EMERGENCY GATES	A small wooden footbridge constructed on masonry piers and abutments is located about 100 feet downstream of the spillway crest.

SERVICE SPILLWAY

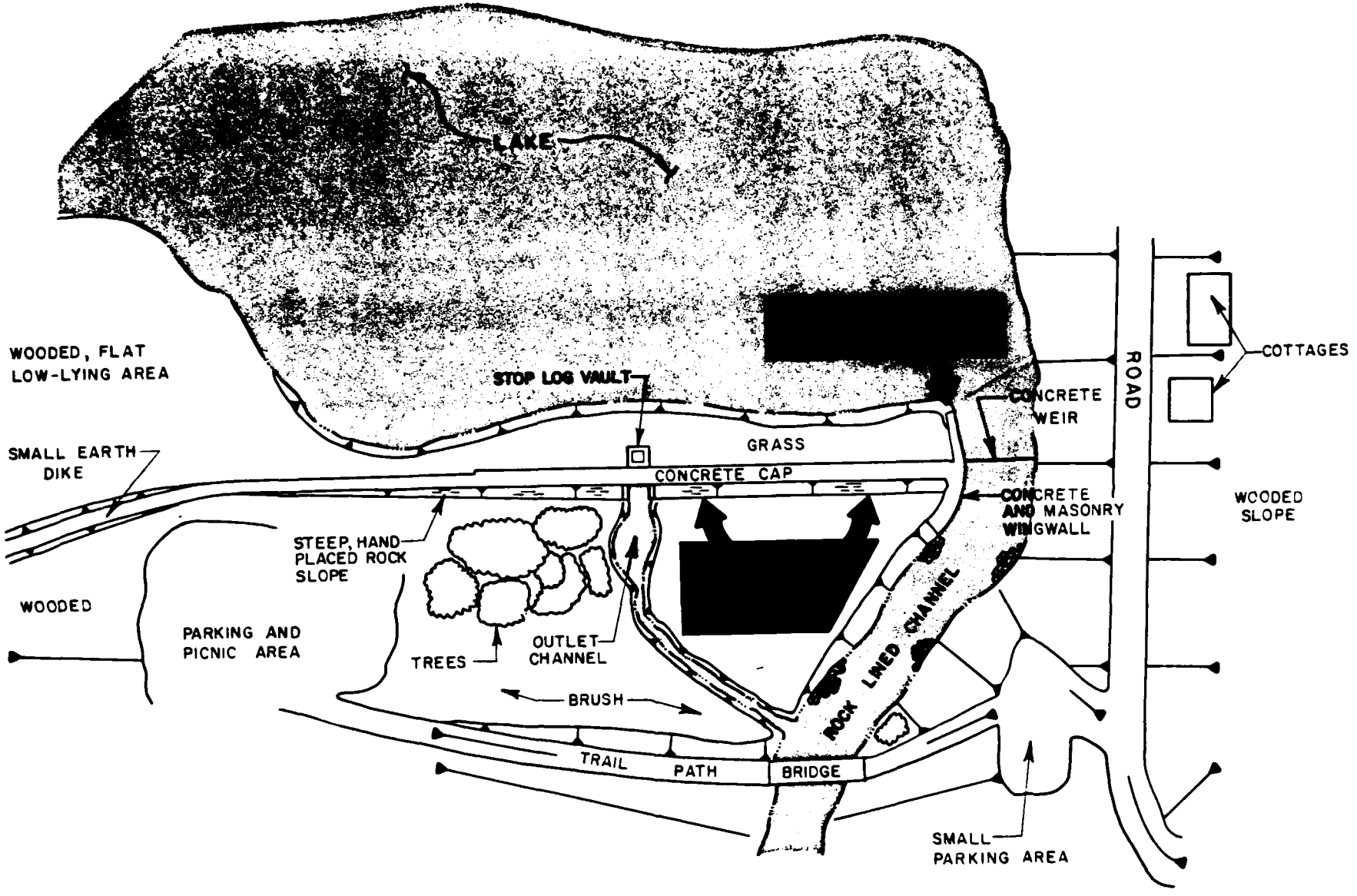
ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00754
TYPE AND CONDITION	N/A.
APPROACH CHANNEL	N/A.
OUTLET STRUCTURE	N/A.
DISCHARGE CHANNEL	N/A.

INSTRUMENTATION

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA · 00754
MONUMENTATION SURVEYS	None.
OBSERVATION WELLS	None.
WEIRS	None.
PIEZOMETERS	None.
OTHERS	

RESERVOIR AREA AND DOWNSTREAM CHANNEL

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00754
SLOPES: RESERVOIR	Moderate to steep, heavily forested slopes with low lying swampy areas along the northern and eastern flanks of the lake.
SEDIMENTATION	None observed.
DOWNSTREAM CHANNEL (OBSTRUCTIONS, DEBRIS, ETC.)	The channel immediately downstream is characterized as a rock lined streambed, 30 to 50 feet wide, set between moderate to steep, heavily wooded slopes. The first channel obstruction is a small concrete bridge for Pennsylvania Route 402 located about 950 feet downstream of the dam.
SLOPES: CHANNEL VALLEY	Narrow (30 to 50 feet wide) for first 1000 feet below dam. Valley broadens significantly for next 9000 feet at which point stream enters Pickeral Pond.
APPROXIMATE NUMBER OF HOMES AND POPULATION	Between 500 and 1,500 feet downstream of the dam, six to seven seasonal dwellings are located about four feet above the streambed. Approximate population = 20 to 30 persons (during peak season and on weekends).

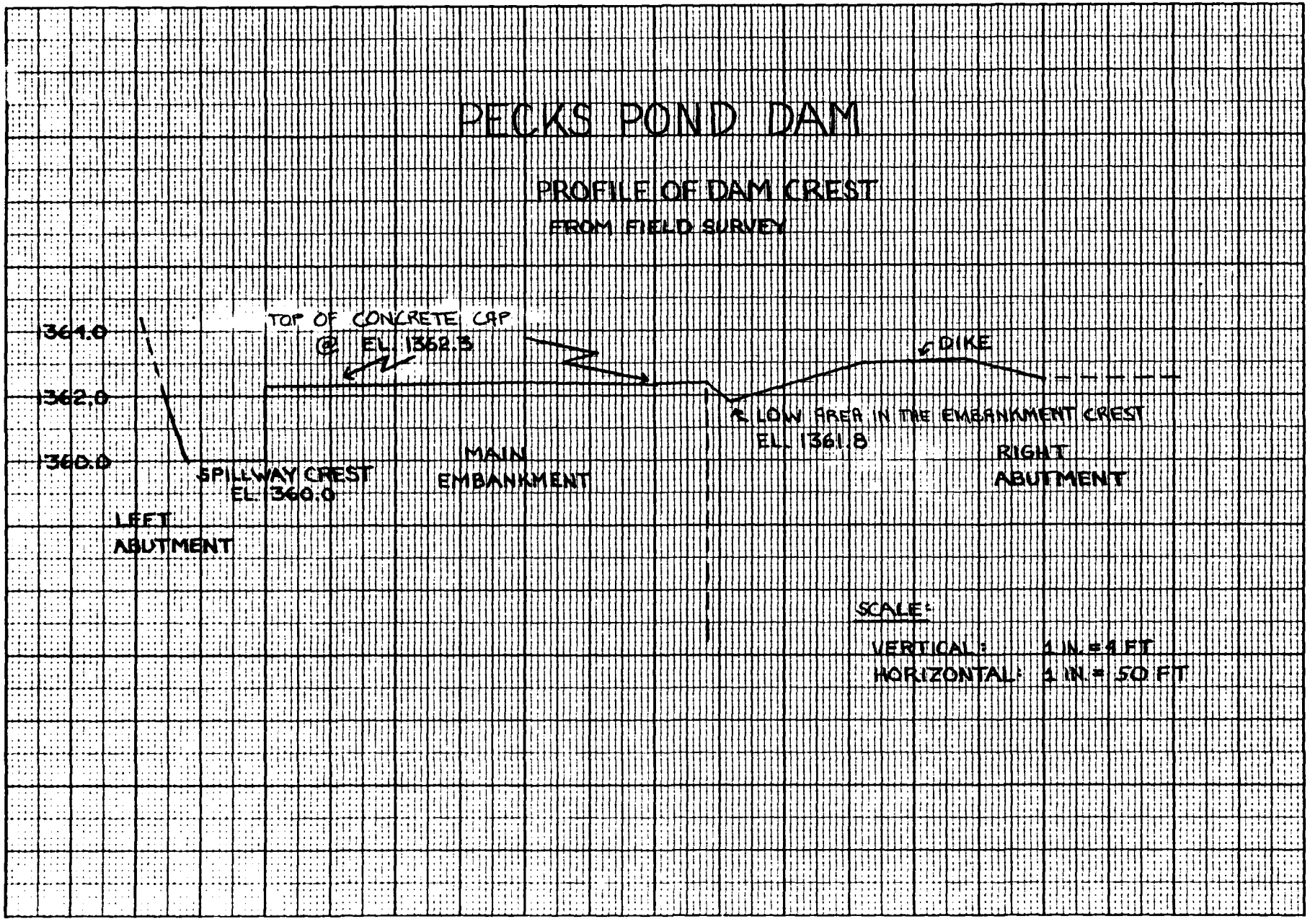


PECKS POND DAM
GENERAL PLAN - FIELD INSPECTION NOTES

PECKS POND DAM

PROFILE OF DAM CREST

FROM FIELD SURVEY



APPENDIX B

ENGINEERING DATA CHECKLIST

CHECK LIST
ENGINEERING DATA
PHASE I

NAME OF DAM Pecks Pond Dam

ITEM	REMARKS	NDI# PA - 00754
PERSONS INTERVIEWED AND TITLE	Jack M. Hugendubler - PennDER Bureau of Design	
REGIONAL VICINITY MAP	See Appendix E, Figure 1.	
CONSTRUCTION HISTORY	Originally constructed around 1906 by the Pennsylvania State Forest Commission. Design by Simon B. Elliot (Commission member). Modified in 1934, 1937, and 1967.	
AVAILABLE DRAWINGS	Drawings contained in PennDER files. See Appendix E, Figures 2 and 3.	
TYPICAL DAM SECTIONS	See Appendix E, Figure 2.	
OUTLETS: PLAN DETAILS DISCHARGE RATINGS	See Appendix E, Figure 3. Discharge rating curves are not available.	

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS	NDI# PA - 00754
SPILLWAY: PLAN SECTION DETAILS	See Appendix E, Figure 2.	
OPERATING EQUIP- MENT PLANS AND DETAILS	None.	
DESIGN REPORTS	None available.	
GEOLOGY REPORTS	None available.	
DESIGN COMPUTATIONS: HYDROLOGY AND HYDRAULICS STABILITY ANALYSES SEEPAGE ANALYSES	None available.	
MATERIAL INVESTIGATIONS: BORING RECORDS LABORATORY TESTING FIELD TESTING	None available.	

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS	NDI# PA - 00754
BORROW SOURCES	Not known.	
POST CONSTRUCTION DAM SURVEYS	None.	
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	No records of formal engineering studies or reports are available. Records of annual state inspections are contained in PennDER files.	
HIGH POOL RECORDS	Not known.	
MONITORING SYSTEMS	None.	
MODIFICATIONS	Extensive repairs to curtail seepage performed in 1934. Outlet conduit installed in 1937 and modified in 1967.	

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS NDI# PA · 00754
PRIOR ACCIDENTS OR FAILURES	None recorded.
MAINTENANCE: RECORDS MANUAL	Standard PennDER Operations and Maintenance Manual is reportedly being prepared by the PennDER, Bureau of Design, but will not be finalized until this inspection report becomes available.
OPERATION: RECORDS MANUAL	Self-regulating.
OPERATIONAL PROCEDURES	The relatively simplistic operation of the stop log mechanisms is to be outlined and contained within the Operations and Maintenance Manual.
WARNING SYSTEM AND/OR COMMUNICATION FACILITIES	Being prepared by PennDER, Bureau of Design.
MISCELLANEOUS	

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CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

NDI ID # PA-00754
PENNDER ID # 52-15

SIZE OF DRAINAGE AREA: 9.2 square miles

ELEVATION TOP NORMAL POOL: 1360.0 STORAGE CAPACITY: 1,100 acre-feet

ELEVATION TOP FLOOD CONTROL POOL: - STORAGE CAPACITY: -

ELEVATION MAXIMUM DESIGN POOL: - STORAGE CAPACITY: -

ELEVATION TOP DAM: 1362.3 STORAGE CAPACITY: 2,140 acre-feet

SPILLWAY DATA

CREST ELEVATION: 1360.0 feet.

TYPE: Trapezoidal, concrete and masonry chute channel.

CREST LENGTH: 30 feet.

CHANNEL LENGTH: Approximately 50 feet (including approach).

SPILLOVER LOCATION: Left abutment.

NUMBER AND TYPE OF GATES: None.

OUTLET WORKS

TYPE: 36-inch diameter BCCMP flows into a concrete box culvert.

LOCATION: Near center of embankment.

ENTRANCE INVERTS: Not known.

EXIT INVERTS: 1355.1 feet.

EMERGENCY DRAWDOWN FACILITIES: Steel plate affixed to inlet end of BCCMP. Drawdown initiated by manually removing plate (via diver). Drawdown controlled by stop logs.

HYDROMETEOROLOGICAL GAGES

TYPE: None.

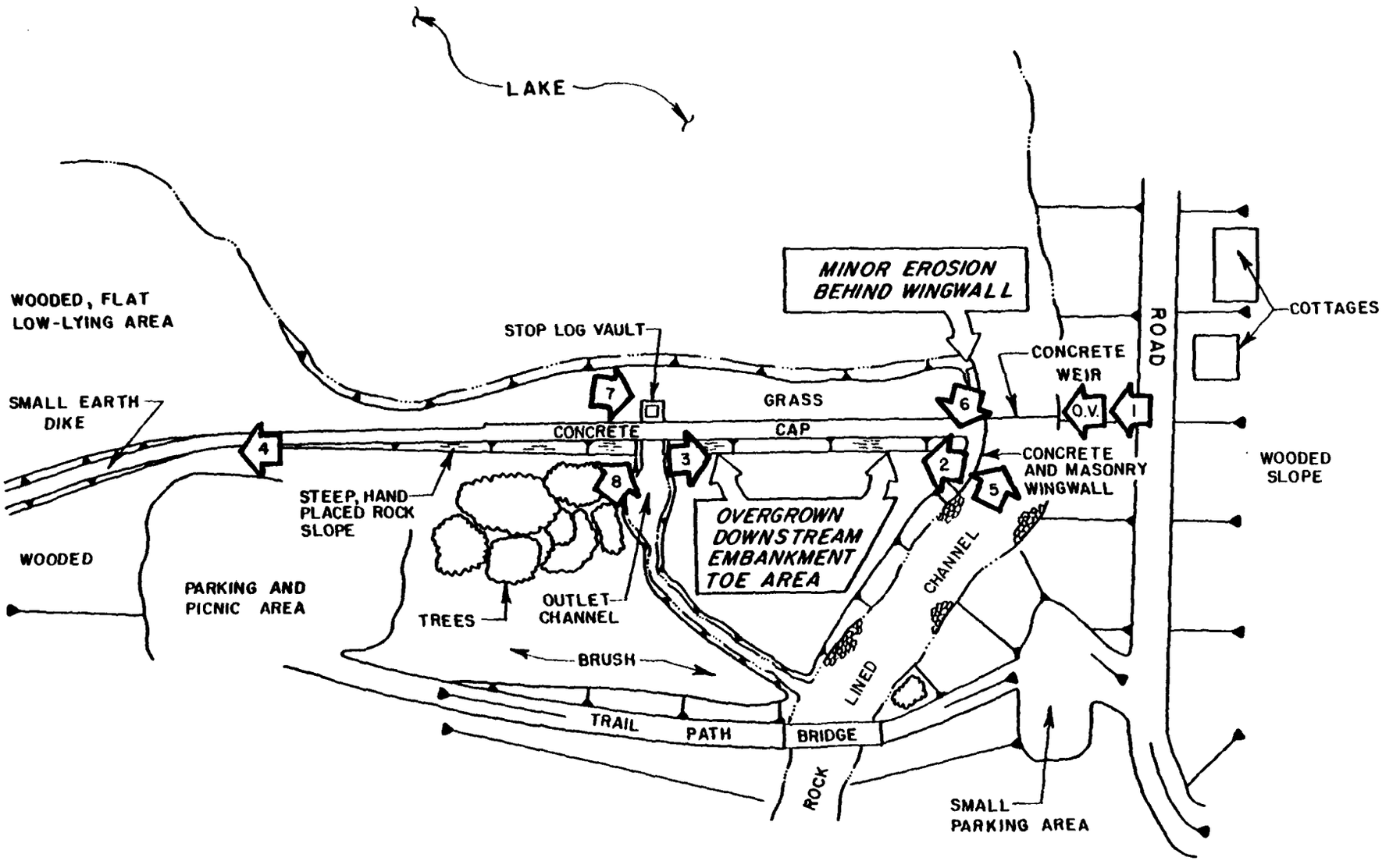
LOCATION: -

RECORDS: -

MAXIMUM NON-DAMAGING DISCHARGE: Not known.

APPENDIX C

PHOTOGRAPHS



PECKS POND DAM
PHOTOGRAPH KEY MAP

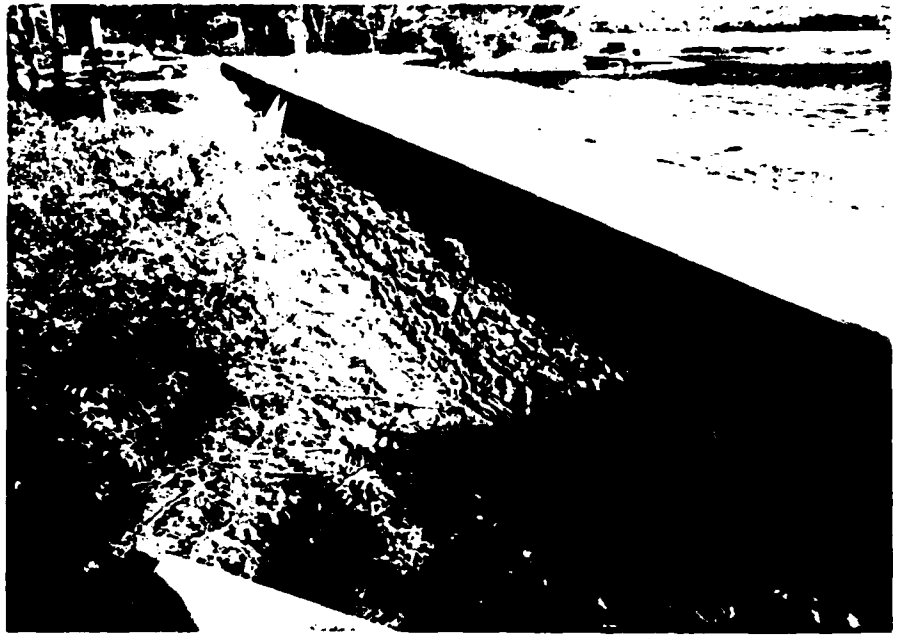
PHOTOGRAPH 1 Overview of Pecks Pond Dam as seen from the left abutment.

PHOTOGRAPH 2 View of the embankment downstream masonry face as seen from the left abutment.

PHOTOGRAPH 3 Close-up view of the embankment downstream masonry face looking toward the left abutment.

PHOTOGRAPH 4 View of the junction of the embankment-right abutment and the small adjoining earth dike that extends into wooded area.

1



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3

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PHOTOGRAPH 5 Close-up view of the concrete spillway crest.

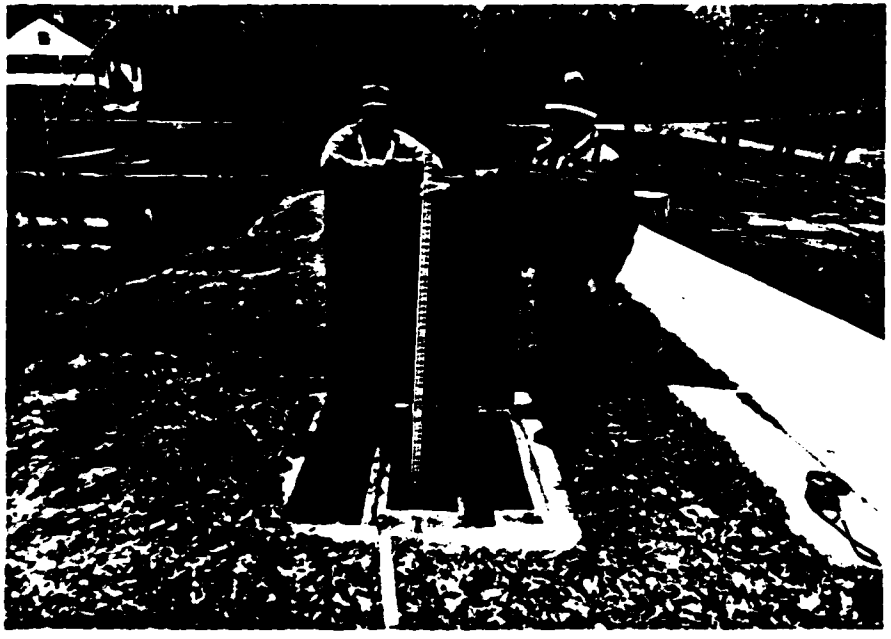
PHOTOGRAPH 6 View, looking downstream, of the spillway channel and masonry sidewall as seen from the embankment crest.

PHOTOGRAPH 7 View of the interior of the concrete vault along the embankment crest that houses the stop log mechanisms.

PHOTOGRAPH 8 View of the discharge end of the outlet conduit located along the downstream embankment face.

5

6



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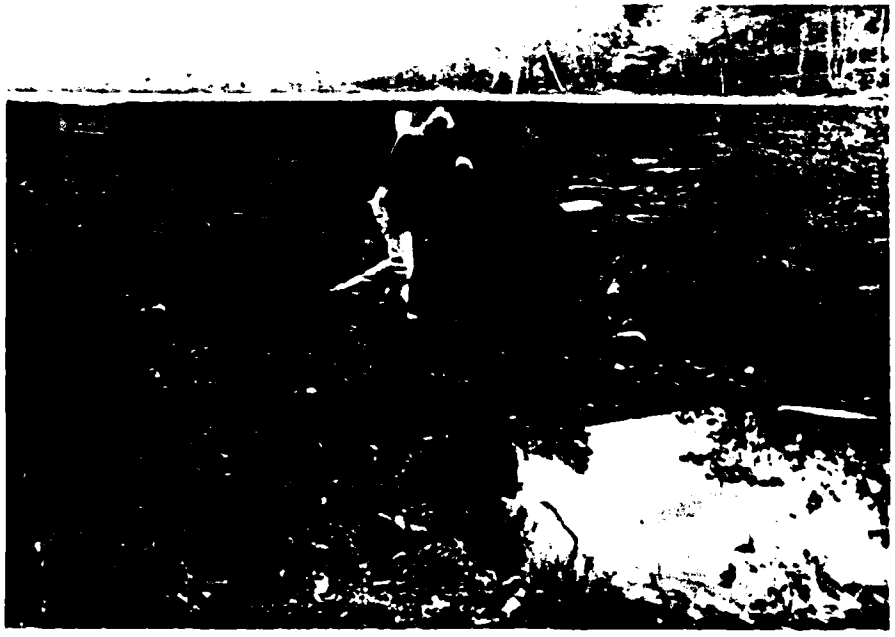

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APPENDIX D

HYDROLOGIC AND HYDRAULIC ANALYSES

PREFACE

The modified HEC-1 program is capable of performing two basic types of hydrologic analyses: 1) the evaluation of the overtopping potential of the dam; and 2) the estimation of the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. Briefly, the computational procedures typically used in the dam overtopping analysis are as follows:

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.

c. Routing of the outflow hydrograph(s) from the reservoir to desired downstream locations. The results provide the peak discharge(s), time(s) of occurrence the peak discharge(s), and the maximum stage(s) of each routed hydrograph at the downstream end of each reach.

The evaluation of the hydrologic-hydraulic consequences resulting from an assumed structural failure (breach) of the dam is typically performed as shown below.

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir.

c. Development of a failure hydrograph(s) based on specified breach criteria and normal reservoir outflow.

d. Routing of the failure hydrograph(s) to desired downstream locations. The results provide estimates of the peak discharge(s), time(s) to peak and maximum water surface elevation(s) of failure hydrograph(s) for each location.

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: PECKS POND DAM

PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.5 INCHES/24 HOURS (1)

STATION	1	2	3
STATION DESCRIPTION	PECKS POND DAM		
DRAINAGE AREA (SQUARE MILES)	9.2		
CUMULATIVE DRAINAGE AREA (SQUARE MILES)	-		
ADJUSTMENT OF PMF FOR DRAINAGE AREA LOCATION (%) (1)	Zone 1		
6 HOURS	111		
12 HOURS	123		
24 HOURS	133		
48 HOURS	142		
72 HOURS	-		
SNYDER HYDROGRAPH PARAMETERS			
ZONE (2)	1		
C_p (3)	0.45		
C_t (3)	1.23		
L' (MILES) (4)	2.6		
$t_p = C_t (L')^{0.6}$ (HOURS)	2.18		
SPILLWAY DATA			
CREST LENGTH (FEET)	30		
FREEBOARD (FEET)	2.3		

(1) HYDROMETEOROLOGICAL REPORT 33, U.S. ARMY CORPS OF ENGINEERS, 1956.
(2) HYDROLOGIC ZONE DEFINED BY CORPS OF ENGINEERS, BALTIMORE DISTRICT, FOR DETERMINATION OF SNYDER COEFFICIENTS (C_p AND C_t).
(3) SNYDER COEFFICIENTS
(4) L' = LENGTH OF LONGEST WATERCOURSE FROM RESERVOIR INLET TO BASIN DIVIDE.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY [illegible] DATE 11-5-80 PROJ. NO. 80-238-754

CHKD. BY JRL DATE 11-18-80 SHEET NO. 1 OF 15

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DAM STATISTICS

HEIGHT OF DAM ≃ 7 FT (FIELD MEASURED; OUTLET INVERT TO TOP OF DAM - SEE NOTE 1)

NORMAL POOL STORAGE CAPACITY ≃ 1100 AC-FT (HEC-1)

MAXIMUM POOL STORAGE CAPACITY = 2140 AC-FT (@ TOP OF DAM) (HEC-1)

DRAINAGE AREA ≃ 9.2 SQUARE MILES. (PLANIMETERED ON USGS TOPO QUADS: PECKS POND, PROMISED LAND, PA)

ELEVATIONS:

TOP OF DAM (DESIGN)	≃ 1361.9	(FIG. 2, SEE NOTE 2)
TOP OF DAM (FIELD)	≃ 1362.3	
NORMAL POOL	≃ 1360.0	(FIG. 2, SEE NOTE 2)
SPILLWAY CREST	≃ 1360.0	(FIG. 2, SEE NOTE 2)
UPSTREAM INLET INVERT (DESIGN)	≃ NOT KNOWN	
DOWNSTREAM OUTLET INVERT (DESIGN)	≃ 1354.6	(FIG. 3, RELATIVE TO TOP OF DAM)
DOWNSTREAM OUTLET INVERT (FIELD)	≃ 1355.1	
STREAMBED @ DAM CENTERLINE	≃ 1352.0	(FIG. 2, SEE NOTE 2)
LOW TOP OF ADJACENT DIKE (FIELD)	≃ 1361.8	

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 10-30-80 PROJ. NO. 80-238-754

CHKD. BY JRL DATE 11-13-80 SHEET NO. 2 OF 15

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NOTE 1: "TOP OF DAM" HERE AND ON ALL SUBSEQUENT CALCULATION SHEETS REFERS TO THE FIELD MEASURED LOW AREA IN THE EMBANKMENT CREST.

NOTE 2: THE DESIGN DRAWINGS ARE BASED ON A NORMAL POOL OR SPILLWAY ELEVATION OF 98.5. HOWEVER, THE USGS TOPO QUAD FOR PECKS POND, PA, INDICATES THAT THE NORMAL POOL ELEVATION IS AT ELEVATION 1360. THEREFORE, IT WILL BE ASSUMED THAT THE SPILLWAY CREST IS AT ELEVATION 1360.0, AND 1261.5 FT (OR 1360 - 98.5 FT) WILL BE ADDED TO THE ELEVATIONS GIVEN ON THE DESIGN DRAWINGS. IT IS NOTED HERE THAT THE ELEVATIONS USED IN THIS ANALYSIS ARE CONSIDERED ESTIMATES, AND ARE NOT NECESSARILY ACCURATE.

DAM CLASSIFICATION

DAM SIZE: INTERMEDIATE (REF 1, TABLE 1)

HAZARD CLASSIFICATION: HIGH (FIELD OBSERVATION)

REQUIRED SDF: PMF (REF 1, TABLE 3)

HYDROGRAPH PARAMETERS

$C_p = 0.45$ (SUPPLIED BY C.O.E., ZONE 1, DELAWARE RIVER BASIN)

$C_t = 1.23$

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L' = LENGTH OF LONGEST WATERCOURSE FROM END OF RESERVOIR TO BASIN DIVIDE = 2.6 MILES.

(NOTE: SINCE L_{CA}, THE LENGTH OF THE LONGEST WATERCOURSE FROM THE RESERVOIR OUTLET TO A POINT OPPOSITE THE BASIN CENTROID, IS LESS THAN THE RESERVOIR LENGTH, THE SNYDER STANDARD LAG IS APPROXIMATED AS $t_p = C_t (L')^{0.6}$ HOURS (AS PER C.O.E.). STREAM LENGTHS WERE MEASURED ON THE PECKS POND, PA, USGS 7.5' TOPO QUAD. HYDROGRAPH VARIABLES USED HERE ARE DEFINED IN REF. 2, IN SECTION ENTITLED "SNYDER SYNTHETIC UNIT HYDROGRAPH.")

$$t_p = C_t (L')^{0.6}$$
$$= (1.23)(2.6)^{0.6}$$
$$= 2.18 \text{ HOURS}$$

RESERVOIR STORAGE CAPACITY

RESERVOIR SURFACE AREAS:

— SURFACE AREA (S.A.) @ NORMAL POOL (ELEV 1360.3) = 420 ACRES

— S.A. @ ELEV 1380 = 1040 ACRES

(PLANIMETERED ON USGS TOPO QUAD, PECKS POND, PA)

S.A. @ TOP OF DAM (ELEV. 1362.3) = 491 ACRES

(BY LINEAR INTERPOLATION)

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DDS DATE 11-5-80 PROJ. NO. 80-238-754

CHKD. BY JRL DATE 11-13-80 SHEET NO. 4 OF 15

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— S.A. @ ELEV 1359.2 = 300 ACRES
— STORAGE @ ELEV 1359.2 = 864 X 10^6 GALLONS
= 810 ACRE-FT (ORIGINAL NORMAL POOL)

(NOTE: THE STORAGE VOLUME AND SURFACE AREA OF THE RESERVOIR AT THE ORIGINAL NORMAL POOL WERE OBTAINED FROM "REPORT UPON THE PECKS POND DAM OF STATE FORESTRY COMMISSION", HARRISBURG, PA, OCTOBER 1919, FOUND IN PENNDER FILES. ACCORDING TO OTHER CORRESPONDENCE FOUND IN THE PENNDER FILES, AND ACCORDING TO FIGURE 2, THE SPILLWAY CREST OR NORMAL POOL WAS RAISED BY 0.8 FEET IN 1934, OR TO ELEVATION 1360.)

"ZERO-STORAGE" ELEVATION: @ ELEV 1359.2, $V = \frac{1}{3}HA$ (CONIC METHOD)
(ORIGINAL NORMAL POOL)

WHERE V = VOLUME = 810 AC-FT
H = MAXIMUM DEPTH OF RESERVOIR, IN FT,
A = SURFACE AREA = 300 ACRES

$\therefore H = \frac{(3)(810)}{300} = 8.1$ FT, AND
ZERO-STORAGE ASSUMED AT 1359.2 - 8.1 = 1351.1 FT

RESERVOIR ELEVATION-STORAGE RELATIONSHIP:

THE ELEVATION-STORAGE RELATIONSHIP IS COMPUTED INTERNALLY IN THE HEC-1 PROGRAM, BY USE OF THE CONIC METHOD, BASED ON THE ELEVATION-SURFACE AREA DATA GIVEN ABOVE (SEE SUMMARY INPUT/OUTPUT SHEETS). ALTHOUGH THE MINIMUM RESERVOIR ELEVATION DOES NOT NECESSARILY OCCUR AT ELEVATION 1351.1, THIS VALUE DOES NOT SEEM UNREASONABLE, AND IT MUST BE USED IN THE HEC-1 INPUT IN ORDER TO MAINTAIN A STORAGE OF 810 ACRE-FT AT ELEVATION 1359.2.

SUBJECT DAM SAFETY INSPECTION
PECK'S POND DAM

BY DJS DATE 10-31-80 PROJ. NO. 80-238-754

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PMP CALCULATIONS

- APPROXIMATE RAINFALL INDEX = 21.5 INCHES
  (CORRESPONDING TO A DURATION OF 24 HOURS AND A DRAINAGE AREA OF 200 SQUARE MILES.)

  (REF 3, FIG. 1)

- DEPTH-AREA-DURATION ZONE 1 (REF 3, FIG. 1)

- ASSUME DATA CORRESPONDING TO A 10-SQUARE MILE AREA MAY BE APPLIED TO THIS 9.2 SQUARE MILE BASIN:

DURATION (HRS)	PERCENT OF INDEX RAINFALL
6	111
12	123
24	133
48	142

(REF. 3, FIG. 3)

HOP BROOK FACTOR (ADJUSTMENT FOR BASIN SHAPE AND FOR THE LESSER LIKELIHOOD OF A SEVERE STORM CENTERING OVER A SMALL BASIN) FOR A DRAINAGE AREA OF 9.2 SQUARE MILES IS 0.80.

(REF 4, P. "?.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY JJS DATE 11-3-80 PROJ. NO. 80-238-754

CHKD. BY JBL DATE 11-18-80 SHEET NO. 6 OF 15

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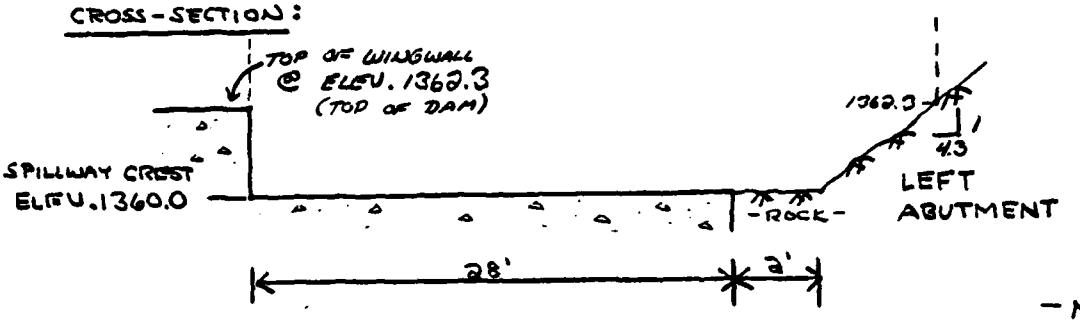
SPILLWAY CAPACITY

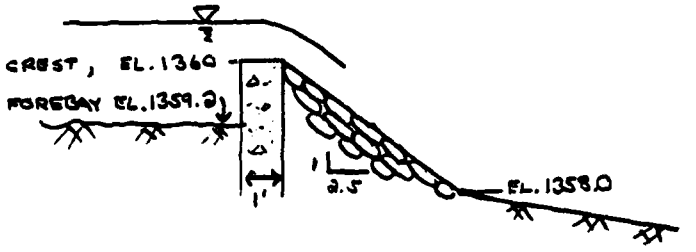
CROSS-SECTION:



- NOT TO SCALE -

(LOOKING UPSTREAM)

PROFILE:



- NOT TO SCALE -

(SKETCHES BASED ON FIELD MEASUREMENTS AND OBSERVATIONS)

THE SPILLWAY CONSISTS OF A ROCK-LINED TRAPEZOIDAL-SHAPED CHUTE CHANNEL WITH DISCHARGES CONTROLLED BY A FLAT-CRESTED WEIR.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 11-3-80 PROJ. NO. 80-238-754

CHKD. BY JRL DATE 11-18-80 SHEET NO. 7 OF 15

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DISCHARGE OVER THE WEIR CAN BE ESTIMATED BY THE RELATION

$$Q = CLH^{3/2} \qquad \text{(REF 5, p. 5-23)}$$

WHERE Q = DISCHARGE OVER THE WEIR, IN CFS,
C = DISCHARGE COEFFICIENT,
L = LENGTH OF WEIR CREST, IN FT,
H = TOTAL HEAD ON WEIR CREST, IN FT.

THE DISCHARGE COEFFICIENT IS ASSUMED TO BE ON THE ORDER OF 2.7 TO 3.3, AS OBTAINED FROM REF. 5, TABLE 5-3, FOR BROAD-CRESTED WEIRS. THE TOTAL EFFECTIVE WEIR CREST LENGTH IS 30 FT (SEE SHEET 6). IT IS ASSUMED THAT DISCHARGE OVER THE LEFT ABUTMENT UP TO ELEVATION 1362.3 (TOP OF DAM AND TOP OF RIGHT SPILLWAY WINGWALL) OCCURS AT THE SAME VELOCITY AS THE DISCHARGE OVER THE WEIR. THEN THE TOTAL SPILLWAY DISCHARGE CAN BE ESTIMATED AS

$$Q_T = Q_W \left(\frac{A_T}{A_W}\right),$$

WHERE Q_T, A_T REFER TO TOTAL SPILLWAY DISCHARGE AND FLOW AREA, RESPECTIVELY,
AND Q_W, A_W REFER TO DISCHARGE AND FLOW AREA ABOVE THE WEIR ONLY.

(HERE, THE AREA OF THE LEFT ABUTMENT UP TO ELEVATION 1362.3 IS CONSIDERED AS PART OF THE "TOTAL" SPILLWAY. SEE CROSS-SECTION SKETCH, SHEET 6.)

APPROACH LOSSES ARE ASSUMED TO BE NEGLIGIBLE HERE.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 11-3-80 PROJ. NO. 80-238-754

CHKD. BY JRL DATE 11-10-80 SHEET NO. 8 OF 15

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SPILLWAY RATING TABLE:

	RESERVOIR ELEVATION (FT)	H (FT)	C ①	Q_w ② (CFS)	A_w ③ (FT^2)	A_T ④ (FT^2)	Q_T ⑤ (CFS)
	1360.0	–	–	–	–	–	0
	1360.5	0.5	2.7	29	15	16	30
	1361.0	1.0	3.0	90	30	32	100
	1361.5	1.5	3.2	176	45	50	200
	1362.0	2.0	3.3	280	60	69	320
(TOP OF DAM)	1362.3	2.3	3.3	345	69	80	400
	1362.5	2.5	3.3	391	75	88	460
	1362.7	2.7	3.3	439	81	96	520
	1363.0	3.0	3.3	514	90	108	620
	1363.5	3.5	3.3	648	105	128	790
	1364.0	4.0	3.3	792	120	148	980
	1365.0	5.0	3.3	1107	150	188	1390
	1366.0	6.0	3.3	1455	180	228	1840
	1367.0	7.0	3.3	1834	210	268	2340

① FROM REF 5, TABLE 5-3.

② $Q_w = CLH^{3/2}$, WHERE $L = 30$ FT.

③ $A_w = LH = 30H$.

④ $A_T = H\left(\frac{30 + [30 + 4.3H]}{2}\right)$ BELOW ELEV. 1362.3

$A_T = 80.4 + 39.9(H - 2.3)$ ABOVE ELEV. 1362.3

⑤ $Q_T = Q_w (A_T / A_w)$, TO NEAREST 10 CFS.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 11-4-80 PROJ. NO. 80-238-754

CHKD. BY JRL DATE 11-18-80 SHEET NO. 9 OF 15

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EMBANKMENT RATING CURVE

ASSUME THAT THE EMBANKMENT BEHAVES ESSENTIALLY AS A BROAD-CRESTED WEIR WHEN OVERTOPPING OCCURS. THUS, THE DISCHARGE CAN BE ESTIMATED BY THE RELATIONSHIP

$$Q = CLH^{3/2}$$ (REF 5, p. 5-23)

WHERE Q = DISCHARGE OVER EMBANKMENT, IN CFS,
L = LENGTH OF EMBANKMENT OVERTOPPED, IN FT,
H = HEAD, IN FT; IN THIS CASE IT IS THE AVERAGE "FLOW-AREA WEIGHTED" HEAD ABOVE THE LOW TOP OF DAM,
C = COEFFICIENT OF DISCHARGE; DEPENDENT UPON THE HEAD AND THE WEIR BREADTH.

LENGTH OF EMBANKMENT INUNDATED VS RESERVOIR ELEVATION:

	ELEVATION (FT)	LENGTH (FT)
(LOW SPOT IN DIKE)	1361.8	0
	1362.0	10
(TOP OF DAM)	1362.3	80
	1362.4	205
	1362.5	210
	1362.6	420
	1362.7	435
	1363.0	470
	1363.5	535
	1364.0	550
	1365.0	585
	1366.0	620
	1367.0	650

(FROM FIELD SURVEY AND USGS TOPO QUAD – PECKS POND, PA)

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 11/17-80 PROJ. NO. 80-238-754

CHKD. BY JJL DATE 11-18-80 SHEET NO. 10 OF 15

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ASSUME THAT INCREMENTAL DISCHARGES OVER THE EMBANKMENT FOR SUCCESSIVE RESERVOIR ELEVATIONS ARE APPROXIMATELY TRAPEZOIDAL IN CROSS-SECTIONAL FLOW AREA. THEN ANY INCREMENTAL AREA OF FLOW CAN BE ESTIMATED AS $H_i[(L_1+L_2)/2]$, WHERE L_1 = LENGTH OF EMBANKMENT OVERTOPPED AT HIGHER ELEVATION, L_2 = LENGTH AT LOWER ELEVATION, H_i = DIFFERENCE IN ELEVATIONS. THUS, THE TOTAL AVERAGE "FLOW-AREA WEIGHTED" HEAD CAN BE ESTIMATED AS $H_w = (\text{TOTAL FLOW AREA} / L_1)$.

EMBANKMENT RATING TABLE:

RESERVOIR ELEVATION (FT)	L_1 (FT)	L_2 (FT)	INCREMENTAL HEAD, H_i (FT)	① INCREMENTAL FLOW AREA, A_i (FT^2)	TOTAL FLOW AREA, A_T (FT^2)	② WEIGHTED HEAD, H_w (FT)	③ $\frac{H_w}{l}$	④ C	⑤ Q (CFS)
1361.8	0	—	0.0	0.0	0.0	0.0	0.0	—	0
1362.0	10	0	0.2	1.00	1.00	0.10	0.004	2.93	0
1362.3	80	10	0.3	13.50	14.50	0.18	0.01	2.93	20
1362.4	205	80	0.1	14.25	28.75	0.14	0.01	2.93	30
1362.5	210	205	0.1	20.75	49.50	0.24	0.01	2.93	70
1362.6	420	210	0.1	31.50	81.00	0.19	0.01	2.97	100
1362.7	435	420	0.1	42.75	123.75	0.28	0.01	2.99	190
1363.0	470	435	0.3	135.75	259.50	0.55	0.02	3.03	580
1363.5	535	470	0.5	251.25	510.75	0.95	0.04	3.03	1500
1364.0	550	535	0.5	271.25	782.00	1.42	0.06	3.04	2830
1365.0	585	550	1.0	567.50	1349.50	2.31	0.09	3.05	6260
1366.0	620	585	1.0	602.50	1952.00	3.15	0.13	3.25	13,570
1367.0	650	620	1.0	635.00	2587.00	3.98	0.16	3.36	15,790

① $A_i = H_i\left(\frac{L_1+L_2}{2}\right)$

② $H_w = (A_T/L_1)$

③ l = BREADTH OF CREST; ASSUME THAT THE EMBANKMENT CREST WIDTH OF 25 FEET IS REPRESENTATIVE OF THE ENTIRE INUNDATED AREA.

④ $C = A(H, l)$; FROM REF 12, FIG. 24.

⑤ $Q = CL_1H_w^{3/2}$, TO THE NEAREST 10 CFS.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 11-4-80 PROJ. NO. 80-238-754

CHKD. BY JRL DATE 11-18-80 SHEET NO. 11 OF 15

GAI CONSULTANTS, INC.
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TOTAL FACILITY RATING TABLE

$Q_{TOTAL} = Q_{SPILLWAY} + Q_{EMBANKMENT}$

	RESERVOIR ELEVATION (FT)	① $Q_{SPILLWAY}$ (CFS)	② $Q_{EMBANKMENT}$ (CFS)	Q_{TOTAL} (CFS)
	1360.0	0	-	0
	1360.5	30	-	30
	1361.0	100	-	100
	1361.5	200	-	200
	1362.0	320	0	320
(TOP OF DAM)	1362.3	400	20	420
	1362.4	430 *	30	460
	1362.5	460	70	530
	1362.6	490 *	100	590
	1362.7	520	190	710
	1363.0	620	580	1200
	1363.5	790	1500	2290
	1364.0	980	2830	3810
	1365.0	1390	6260	7650
	1366.0	1840	10,570	12,410
	1367.0	2340	15,790	18,130

* - BY LINEAR INTERPOLATION.

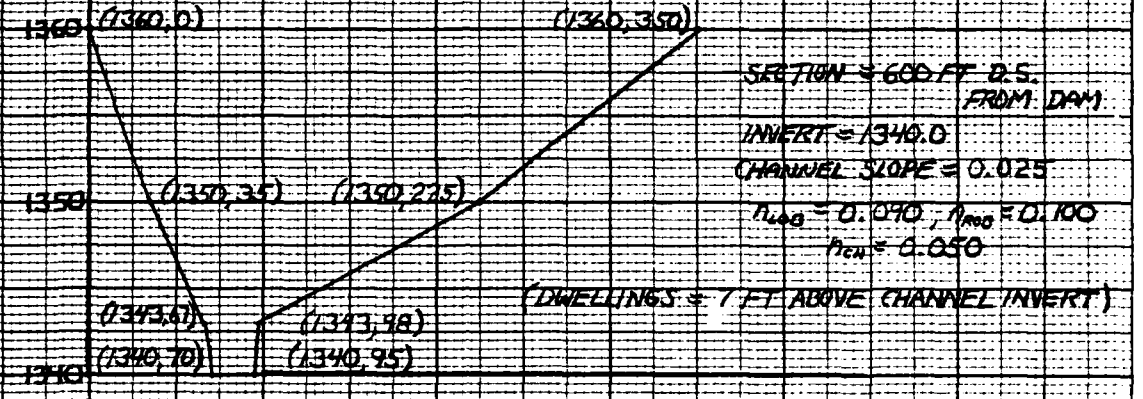
① - FROM SHEET 8.

② - FROM SHEET 10.

SUBJECT: Pecks Pond Dam
BY: DJS DATE: 12-1-80 SHEET NO. 12 OF 65
CHKD. BY: DATE: 12-1-80 PROJECT NO. 80-235-154

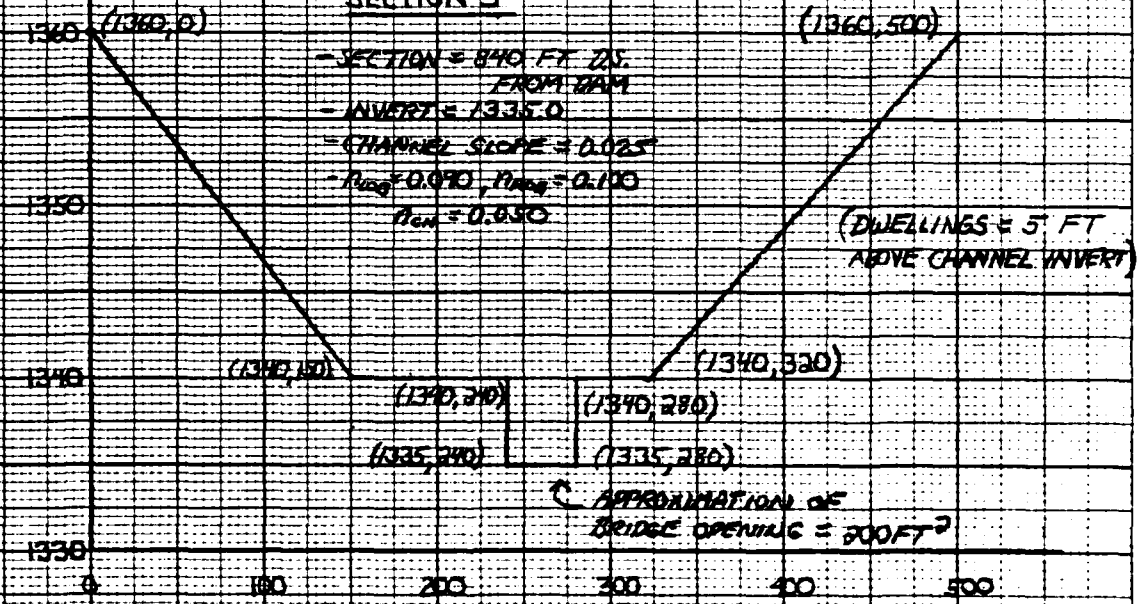
DOWNSTREAM ROUTING SECTIONS

SECTION 2



SECTION = 600 FT D.S. FROM DAM
INVERT = 1340.0
CHANNEL SLOPE = 0.025
$n_{LOB} = 0.090$, $n_{ROB} = 0.100$
$n_{CH} = 0.050$
(DWELLINGS = 7 FT ABOVE CHANNEL INVERT)

SECTION 3



- SECTION = 840 FT D.S. FROM DAM
- INVERT = 1335.0
- CHANNEL SLOPE = 0.025
- $n_{LOB} = 0.090$, $n_{ROB} = 0.100$
  $n_{CH} = 0.050$

(DWELLINGS = 5 FT ABOVE CHANNEL INVERT)

← APPROXIMATION OF BRIDGE OPENING = 200 FT²

NOTE: SECTIONS BASED ON FIELD NOTES AND OBSERVATIONS AND USGS TOPO QUAD – PECKS POND, PA. ELEVATIONS ARE CONSIDERED ESTIMATES AND ARE NOT NECESSARILY ACCURATE.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 12-1-80 PROJ. NO. 80-238-754

CHKD. BY DLB DATE 12-1-80 SHEET NO. 13 OF 15

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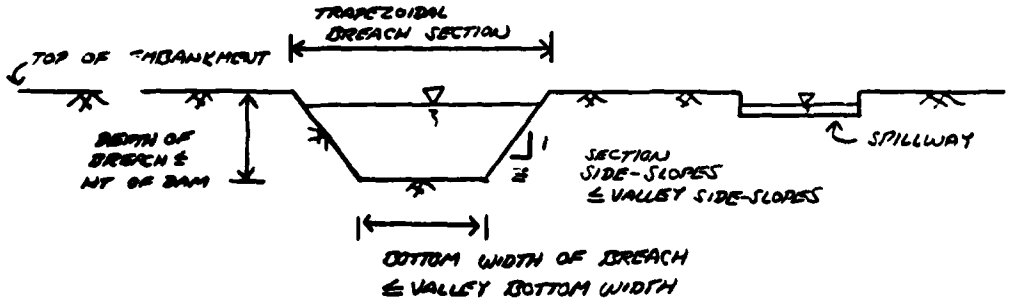
BREACH ASSUMPTIONS

TYPICAL BREACH SECTION:



HEC-1 BREACHING ANALYSIS INPUT:

PLAN	BREACH BOTTOM WIDTH (FT)	MAX. BREACH DEPTH (FT)	SECTION SIDE-SLOPES	BREACH TIME (HRS)
① MAX. BREACH SECTION	100	7	5H:1V	1.0
② AVG. BREACH SECTION	50	7	2:1	1.0
③ MIN. BREACH SECTION	20	7	1:1	0.5

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 12-1-80 PROJ. NO. 80-238-754

CHKD. BY DLB DATE 12-1-80 SHEET NO. 14 OF 15

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THE BREACH ASSUMPTIONS LISTED ON SHEET 13 ARE BASED ON THE SUGGESTED RANGES PROVIDED BY THE C.O.E. (BALTIMORE DISTRICT), AND ON THE PHYSICAL CONSTRAINTS OF THE DAM AND SURROUNDING TERRAIN:

- DEPTH OF BREACH OPENING = 7 FT
  (TOP OF DAM TO INVERT OF OUTLET)
- LENGTH OF BREACHABLE EMBANKMENT = 170 FT (FIELD SURVEY)
- VALLEY BOTTOM WIDTH = 300 FT (FIELD OBSERVATION)

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY DJS DATE 12-4-80 PROJ. NO. 80-238-754

CHKD. BY WJV DATE 12-5-80 SHEET NO. 15 OF 15

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HEC-1 DAM BREACHING ANALYSIS OUTPUT

RESERVOIR DATA: (UNDER 0.15 PMF BASE FLOW CONDITIONS)

PLAN NUMBER (SHEET 13)	ACTUAL MAX. FLOW DURING FAIL TIME (CFS)	CORRESPONDING TIME OF PEAK (HRS)	INTERPOLATED OR HEC-1 ROUTED MAX. FLOW DURING FAIL TIME (CFS)	CORRESPONDING TIME OF PEAK (HRS)	ACTUAL PEAK FLOW THROUGH DAM (CFS)	CORRESPONDING TIME OF PEAK (HRS)	TIME OF INITIAL BREACH (HRS)
①	7421	46.0	7421	46.0	7421	46.0	45.0
②	3991	46.0	3991	46.0	3991	46.0	45.0
③	1989	45.5	1989	45.5	1989	45.5	45.0

NOTE: THE 0.15PMF NON-BREACH PEAK OUTFLOW = 574 CFS

DOWNSTREAM ROUTING DATA: (UNDER 0.15 PMF BASE FLOW CONDITIONS)

PLAN NUMBER	PEAK FLOW (CFS)	CORRESPONDING WATER SURFACE ELEVATION * (FT)	WATER SURFACE ELEVATION W/O BREACH ** (FT)	ELEVATION DIFFERENCE (FT)
OUTPUT @ SECTION 2; 600 FT D.S. FROM DAM				
①	7271	1349.0	1342.6	+6.4
②	3930	1346.9	1342.6	+4.3
③	2026	1345.1	1342.6	+2.5
OUTPUT @ SECTION 3; 840 FT D.S. FROM DAM				
①	7232	1342.9	1337.0	+5.9
②	3974	1341.2	1337.0	+4.2
③	2038	1339.5	1337.0	+2.5

* FROM SUMMARY INPUT/OUTPUT SHEETS, SHEET I.

** FROM SUMMARY INPUT/OUTPUT SHEETS, SHEET E.

NOTE: DAMAGE LEVELS OF STRUCTURES @ SECTION 2 = 1347
DAMAGE LEVELS OF STRUCTURES @ SECTION 3 = 1340

OVERTOPPING ANALYSIS

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM
BY WJV DATE 12-5-80 PROJ. NO. 80-239-754
CHKD. BY RRS DATE 12-6-80 SHEET NO. A OF I

SUMMARY INPUT/OUTPUT SHEETS

DAM SAFETY INSPECTION
PECKS POND DAM **** OVERTOPPING ANALYSIS ****
15-MINUTE TIME STEP AND 72-HOUR STORM DURATION

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METHC	IPLT	IPNT	NSTAN
200	0	15	0	0	0	0	0	0	0
			JOPER	NMT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 5 LRTIO= 1
RTIOS= .05 .10 .15 .50 1.00

****

SUB-AREA RUNOFF COMPUTATION

RESERVOIR INFLOW COMPUTATION

JSTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	IMAKE	ISTAGE	TAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	9.20	0.00	9.20	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.50	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

INITIAL AND CONSTANT RAINFALL LOSSES AS PER COE

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 2.10 CP= .45 NTA= 0

BASEFLOW PARAMETERS AS PER COE

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNIDER CP AND TP AND TC= 9.15 AND R=13.85 INTERVALS

UNIT HYDROGRAPH 79 END-OF-PERIOD ORDINATES, LAG= 2.19 HOURS, CP= .45 VOL= 1.00

42.	159.	325.	521.	735.	937.	1095.	1203.	1250.	1215.
1133.	1054.	980.	912.	848.	789.	734.	683.	636.	591.
550.	517.	476.	443.	412.	383.	357.	332.	309.	287.
267.	248.	231.	215.	200.	186.	173.	161.	150.	139.
130.	121.	112.	104.	97.	90.	84.	78.	73.	68.
63.	59.	55.	51.	47.	44.	41.	38.	35.	33.
31.	28.	26.	25.	23.	21.	20.	18.	17.	16.
15.	14.	13.	12.	11.	10.	10.	9.	8.	

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.42	22.04	2.39	5234MM.
										(620.)(560.)(61.)(14823.47)			

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SUBJECT: DAM SAFETY INSPECTION
PECKS POND DAM

BY: WJV DATE: 12-5-80 PROJ. NO. 80-238-754
CHKD. BY: DJS DATE: 12-6-80 SHEET NO. B OF I

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RESERVOIR INFLOW HYDROGRAPHS

0.10 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1695.	1300.	522.	182.	52347.
CMS	48.	37.	15.	5.	1482.
INCHES		1.32	2.11	2.21	2.21
MM		33.60	53.65	56.02	56.02
AC-FT		649.	1036.	1082.	1082.
THOUS CU M		800.	1278.	1334.	1334.

0.15 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2543.	1962.	783.	273.	78521.
CMS	72.	56.	22.	8.	2223.
INCHES		1.98	3.17	3.31	3.31
MM		50.40	80.48	84.03	84.03
AC-FT		973.	1554.	1622.	1622.
THOUS CU M		1200.	1917.	2001.	2001.

0.50 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8476.	6542.	2611.	909.	261736.
CMS	240.	185.	74.	26.	7412.
INCHES		6.61	10.56	11.03	11.03
MM		168.00	268.26	280.09	280.09
AC-FT		3244.	5180.	5408.	5408.
THOUS CU M		4001.	6389.	6670.	6670.

PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	16953.	13083.	5223.	1818.	523472.
CMS	480.	370.	148.	51.	14823.
INCHES		13.23	21.12	22.05	22.05
MM		336.01	536.53	560.17	560.17
AC-FT		6487.	10359.	10816.	10816.
THOUS CU M		8002.	12778.	13341.	13341.

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HYDROGRAPH ROUTING

ROUTE THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
101	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1360.	-1

STAGE	1360.00	1360.50	1361.00	1361.50	1362.00	1362.30	1362.40	1362.50	1362.60
	1363.00	1363.50	1364.00	1365.00	1366.00	1367.00			
FLOW	0.00	30.00	100.00	200.00	320.00	420.00	460.00	530.00	590.00
	1200.00	2290.00	3810.00	7650.00	12410.00	18130.00			

SURFACE AREA=	0.	300.	420.	491.	1040.
CAPACITY=	0.	810.	1497.	2143.	15342.
ELEVATION=	1351.	1359.	1360.	1362.	1380.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
1360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1362.3	0.0	0.0	0.

SUBJECT DAM SAFETY INSPECTION

BY WJV DATE 12-5-80 PROJ. NO. 80-238-754

CHKD. BY RJS DATE 12-6-80 SHEET NO. C OF I

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RESERVOIR OUTFLOW HYDROGRAPHS

0.10 PMF

PEAK OUTFLOW IS 286. AT TIME 49.75 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	286.	201.	234.	93.	26899.
CMS	8.	6.	7.	3.	762.
INCHES		.28	.95	1.13	1.13
MM		7.21	24.03	28.78	28.78
AC-FT		139.	464.	556.	556.
THOUS CU M		172.	572.	686.	686.

0.15 PMF

PEAK OUTFLOW IS 574. AT TIME 48.75 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	574.	553.	408.	160.	46189.
CMS	16.	16.	12.	5.	1307.
INCHES		.56	1.65	1.95	1.95
MM		14.19	41.95	49.41	49.41
AC-FT		274.	810.	954.	954.
THOUS CU M		338.	999.	1177.	1177.

0.50 PMF

PEAK OUTFLOW IS 6177. AT TIME 44.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6177.	5129.	2186.	776.	223518.
CMS	175.	145.	62.	22.	6329.
INCHES		5.19	8.84	9.42	9.42
MM		131.72	224.57	239.19	239.19
AC-FT		2543.	4336.	4618.	4618.
THOUS CU M		3137.	5348.	5696.	5696.

PMF

PEAK OUTFLOW IS 14286. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14286.	11750.	4819.	1675.	492540.
CMS	405.	333.	136.	47.	13664.
INCHES		11.88	19.49	20.33	20.33
MM		301.77	495.08	516.37	516.37
AC-FT		5026.	9559.	9970.	9970.
THOUS CU M		7187.	11791.	12298.	12298.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE FROM DAM TO SECTION 2, 600 FT D.S. FROM DAM

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
102	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPAP	LSTA
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM
BY WJV DATE 12-5-80 PROJ. NO. 80-238-754
CHKD. BY DJS DATE 12-6-80 SHEET NO. D OF T

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NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0400	.0500	.1000	1340.0	1360.0	600.	.02500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1360.00 35.00 1350.00 67.00 1343.00 70.00 1340.00 95.00 1340.00
98.00 1343.00 225.00 1350.00 350.00 1360.00

STORAGE	0.00	.38	.79	1.23	1.90	2.92	4.29	6.01	8.07
	13.22	16.22	19.46	22.95	26.68	30.66	34.88	39.34	44.05
OUTFLOW	0.00	127.51	404.24	803.18	1380.85	2161.65	3187.77	4495.43	6117.71
	10470.93	13281.43	16483.18	20089.75	24115.15	28573.59	33479.31	38846.58	44689.56
STAGE	1340.00	1341.05	1342.11	1343.16	1344.21	1345.26	1346.32	1347.37	1348.42
	1350.53	1351.58	1352.63	1353.68	1354.74	1355.79	1356.84	1357.89	1358.95
FLOW	0.00	127.51	404.24	803.18	1380.85	2161.65	3187.77	4495.43	6117.71
	10470.93	13281.43	16483.18	20089.75	24115.15	28573.59	33479.31	38846.58	44689.56

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE FROM SECTION 2 TO SECTION 3; 840 FT D.S. FROM DAM

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
203	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0900	.0500	.1000	1335.0	1360.0	240.	.02500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1360.00 150.00 1340.00 240.00 1340.00 240.00 1335.00 280.00 1335.00
280.00 1340.00 320.00 1340.00 500.00 1360.00

SUBJECT DAM SAFETY INSPECTION

PECKS POND DAM

BY WJV DATE 12-5-80 PROJ. NO. 80-238-754

CHKD. BY RRS DATE 12-6-80 SHEET NO. E OF F

STORAGE	0.00	.29	.58	.87	1.35	2.69	4.19	5.85	7.67
	11.77	14.05	16.50	19.10	21.86	24.78	27.85	31.08	34.47
OUTFLOW	0.00	285.39	870.60	1647.94	2622.36	4484.05	7165.71	10603.66	14790.43
	25456.70	31974.77	39313.31	47497.03	56551.32	66501.99	77375.01	89196.39	101992.13
STAGE	1335.00	1336.32	1337.63	1338.95	1340.26	1341.58	1342.89	1344.21	1345.53
	1348.16	1349.47	1350.79	1352.11	1353.42	1354.74	1356.05	1357.37	1358.68
FLOW	0.00	285.39	870.60	1647.94	2622.36	4484.05	7165.71	10603.66	14790.43
	25456.70	31974.77	39313.31	47497.03	56551.32	66501.99	77375.01	89196.39	101992.13

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1360.00	1360.00	1362.30
STORAGE	1097.	1097.	2143.
OUTFLOW	0.	0.	420.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.05	1361.01	0.00	1538.	103.	0.00	51.00	0.00
.10	1361.86	0.00	1929.	286.	0.00	49.75	0.00
.15	1362.57	.27	2278.	574.	10.50	48.75	0.00
.50	1364.62	2.32	3350.	6177.	21.75	44.00	0.00
1.00	1366.33	4.03	4333.	14286.	26.25	43.50	0.00

OVERTOPPING OCCURS @ 0.13 PMF

STATION 102

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.15	574.	1342.6	48.75

SECTION 2 @ ≈ 600 FT DS FROM DAM

STATION 203

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.15	574.	1337.0	48.75

SECTION 3 @ ≈ 840FT DS FROM DAM

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Engineers • Geologists • Planners
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BREACHING ANALYSIS

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM
BY WJV DATE 12-5-80 PROJ. NO. 80-238-754
CHKD. BY RDS DATE 12-6-80 SHEET NO. E OF I

Engineers • Geologists • Environmental Specialists

INPUT DATA IS THE SAME AS FOR THE OVERTOPPING ANALYSIS WITH THE ADDITION OF THE BREACH DATA GIVEN HERE

```
     DAM SAFETY INSPECTION
     PECKS POND DAM **** BREACHING ANALYSIS ****
     15-MINUTE TIME STEP AND 72-HOUR STORM DURATION

                    JOB SPECIFICATION
      NU      NHR      NMIN     IDAY      IHR      IMIN     METHC     IPLT     IPRT    HSTAN
     288        0        15        0        0        0        0        0        0        0
                                JOPER      NWT    LRUPT    TRACE
                                    5        0        0        0

                 MULTI-PLAN ANALYSES TO BE PERFORMED
                 NPLAN= 4 NRTIO= 1 LMTIO= 1
     RTIOS=     .15

**********       **********       **********       **********       **********
```

PLAN

HYDROGRAPH ROUTING

(1)

```
     ROUTE THROUGH RESERVOIR

                                    DAM DATA
                                TOPEL     COOD     EXPO     DAMWID
                               1362.3      0.0      0.0         0.

                              DAM BREACH DATA
                          BRWID        Z     ELBR    TFAIL     WSEL   FAILEL
                           100.     5.00  1355.10     1.00  1360.00  1362.30

                                STATION    101, PLAN 1, RATIO 1

     BEGIN DAM FAILURE AT 45.00 HOURS

     PEAK OUTFLOW IS     7421. AT TIME  46.00 HOURS
```

(2)

```
                              DAM BREACH DATA
                          BRWID        Z     ELBR    TFAIL     WSEL   FAILEL
                            50.     2.00  1355.10     1.00  1360.00  1362.30

                                STATION    101, PLAN 2, RATIO 1

     BEGIN DAM FAILURE AT 45.00 HOURS

     PEAK OUTFLOW IS     3991. AT TIME  46.00 HOURS
```

(3)

```
                              DAM BREACH DATA
                          BRWID        Z     ELBR    TFAIL     WSEL   FAILEL
                            20.     1.00  1355.10      .50  1360.00  1362.30

                                STATION    101, PLAN 3, RATIO 1

     BEGIN DAM FAILURE AT 45.00 HOURS
```

SUBJECT DAM SAFETY INSPECTION

PECKS POND DAM

BY WJV DATE 12-5-80 PROJ. NO. 80-238-754

CHKD. BY JSS DATE 12-6-80 SHEET NO. G OF I

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THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .021 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .250 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

PLAN (1)

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
45.000	0.000	431.		431.		0.	0.	0.
45.021	.021	501.		454.		47.	47.	0.
45.042	.042	571.		491.		79.	126.	0.
45.063	.063	641.		539.		102.	228.	0.
45.083	.083	711.		595.		116.	344.	1.
45.104	.104	781.		658.		123.	467.	1.
45.125	.125	851.		729.		122.	589.	1.
45.146	.146	921.		805.		116.	705.	1.
45.167	.167	991.		888.		104.	809.	1.
45.188	.188	1062.		976.		86.	894.	2.
45.208	.208	1132.		1070.		62.	956.	2.
45.229	.229	1202.		1168.		34.	990.	2.
45.250	.250	1272.		1272.		-0.	990.	2.
45.271	.271	1404.		1380.		23.	1013.	2.
45.292	.292	1536.		1494.		42.	1055.	2.
45.313	.313	1668.		1611.		56.	1112.	2.
45.333	.333	1800.		1733.		66.	1178.	2.
45.354	.354	1931.		1860.		72.	1250.	2.
45.375	.375	2063.		1990.		73.	1323.	2.
45.396	.396	2195.		2125.		71.	1394.	2.
45.417	.417	2327.		2263.		64.	1458.	3.
45.438	.437	2459.		2405.		54.	1511.	3.
45.458	.458	2591.		2551.		39.	1551.	3.
45.479	.479	2723.		2701.		21.	1572.	3.
45.500	.500	2855.		2855.		0.	1572.	3.
45.521	.521	3029.		3011.		18.	1590.	3.
45.542	.542	3204.		3172.		32.	1622.	3.
45.563	.562	3379.		3335.		43.	1665.	3.
45.583	.583	3553.		3503.		51.	1716.	3.
45.604	.604	3728.		3673.		55.	1771.	3.
45.625	.625	3903.		3847.		56.	1827.	3.
45.646	.646	4077.		4024.		54.	1880.	3.
45.667	.667	4252.		4204.		49.	1929.	3.
45.688	.687	4427.		4386.		41.	1969.	3.
45.708	.708	4601.		4572.		30.	1999.	3.
45.729	.729	4776.		4760.		16.	2015.	3.
45.750	.750	4951.		4951.		0.	2015.	3.
45.771	.771	5157.		5144.		12.	2027.	3.
45.792	.792	5362.		5340.		22.	2050.	4.
45.813	.812	5568.		5539.		30.	2079.	4.
45.833	.833	5774.		5739.		35.	2114.	4.
45.854	.854	5980.		5942.		38.	2152.	4.
45.875	.875	6186.		6148.		38.	2190.	4.
45.896	.896	6392.		6355.		37.	2227.	4.
45.917	.917	6597.		6564.		33.	2260.	4.
45.938	.937	6803.		6776.		28.	2288.	4.
45.958	.958	7009.		6989.		20.	2308.	4.
45.979	.979	7215.		7204.		11.	2319.	4.
46.000	1.000	(742)		(742)		0.	2319.	4.

SUBJECT DAM SAFETY INSPECTION
PECKS POND DAM

BY WJV DATE 12-5-80 PROJ. NO. 80-238-754

CHKD. BY DJS DATE 12-6-80 SHEET NO. H OF I

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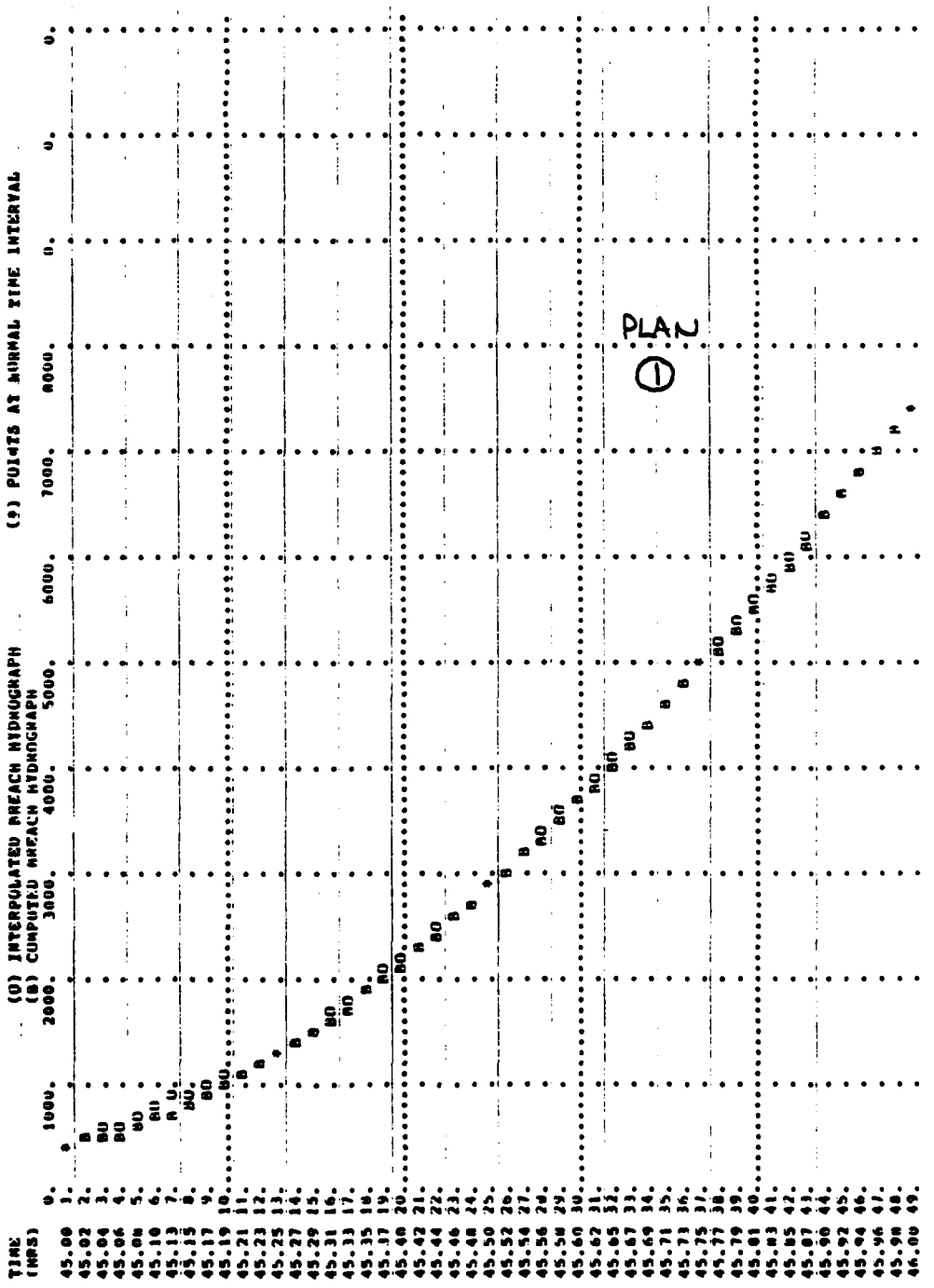

SUBJECT DAM SAFETY INSPECTION

PECKS POND DAM

BY WJV DATE 12-5-80 PROJ. NO. 80-238-754

CHKD. BY RDS DATE 12-6-80 SHEET NO. I OF I

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Environmental Specialists

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1360.00	1360.00	1362.30
STORAGE	1097.	1097.	2143.
OUTFLOW	0.	0.	420.

PLAN	RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1	.15	1362.35	.05	2169.	7421.	.81	46.00	45.00
2	.15	1362.36	.06	2175.	3991.	1.06	46.00	45.00
3	.15	1362.36	.06	2173.	1989.	1.00	45.50	45.00

STATION 102

PLAN	RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1	.15	7271.	1349.0	46.00
2	.15	3930.	1346.9	46.25
3	.15	2026.	1345.1	45.75

SECTION 2 @ ≈ 600 FT DS FROM DAM

STATION 203

PLAN	RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1	.15	7232.	1342.9	46.00
2	.15	3974.	1341.2	46.25
3	.15	2038.	1339.5	45.75

SECTION 3 @ ≈ 840 FT DS FROM DAM

LIST OF REFERENCES

1. "Recommended Guidelines for Safety Inspection of Dams," prepared by Department of the Army, Office of the Chief of Engineers, Washington, D. C. (Appendix D).

2. "Unit Hydrograph Concepts and Calculations," by the U. S. Army, Corps of Engineers, Baltimore District (L-519).

3. "Seasonal Variation of Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24, and 48 Hours," Hydrometeorological Report No. 33, prepared by J. T. Reidel, J. F. Appleby and R. W. Schloemer, Hydrologic Service Division, Hydrometeorological Section, U. S. Army, Corps of Engineers, Washington, D. C., April 1956.

4. Design of Small Dams, U. S. Department of the Interior, Bureau of Reclamation, Washington, D. C., 1973.

5. Handbook of Hydraulics, H. W. King, and E. F. Brater, McGraw-Hill, Inc., New York, 1963.

6. Standard Handbook for Civil Engineers, F. S. Merritt, McGraw-Hill, Inc., New York, 1963.

7. Open-Channel Hydraulics, V. T. Chow, McGraw-Hill, Inc., New York, 1959.

8. Weir Experiments, Coefficients, and Formulas, R. E. Horton, Water Supply and Irrigation Paper No. 200, Department of the Interior, United States Geological Survey, Washington, D. C., 1907.

9. "Probable Maximum Precipitation, Susquehanna River Drainage Above Harrisburg, Pennsylvania," Hydrometerological Report No. 40, prepared by H. V. Goodyear and J. T. Riedel, Hydrometeorological Branch Office of Hydrology, U. S. Weather Bureau, U. S. Department of Commerce, Washington, D. C., May, 1965.

10. Flood Hydrograph Package (HEC- 1) Dam Safety Version, Hydrologic Engineering Center, U. S. Army, Corps of Engineers, Davis, California, July 1978.

11. "Simulation of Flow Through Broad Crest Navigation Dams with Radial Gates," R. W. Schmitt, U. S. Army, Corps of Engineers, Pittsburgh District.

12. "Hydraulics of Bridge Waterways," BPR, 1970, Discharge Coefficient Based on Criteria for Embankment Shaped Weirs, Figure 24, page 46.

13. Applied Hydraulics in Engineering, H. M. Morris and J. N. Wiggert, Virginia Polytechnic Institute and State University, 2nd Edition, The Ronald Press Company, New York, 1972.

14. Standard Mathematical Tables, 21st Edition, The Chemical Rubber Company, 1973, page 15.

15. Engineering Field Manual, U. S. Department of Agriculture, Soil Conservation Service, 2nd Edition, Washington, D. C., 1969.

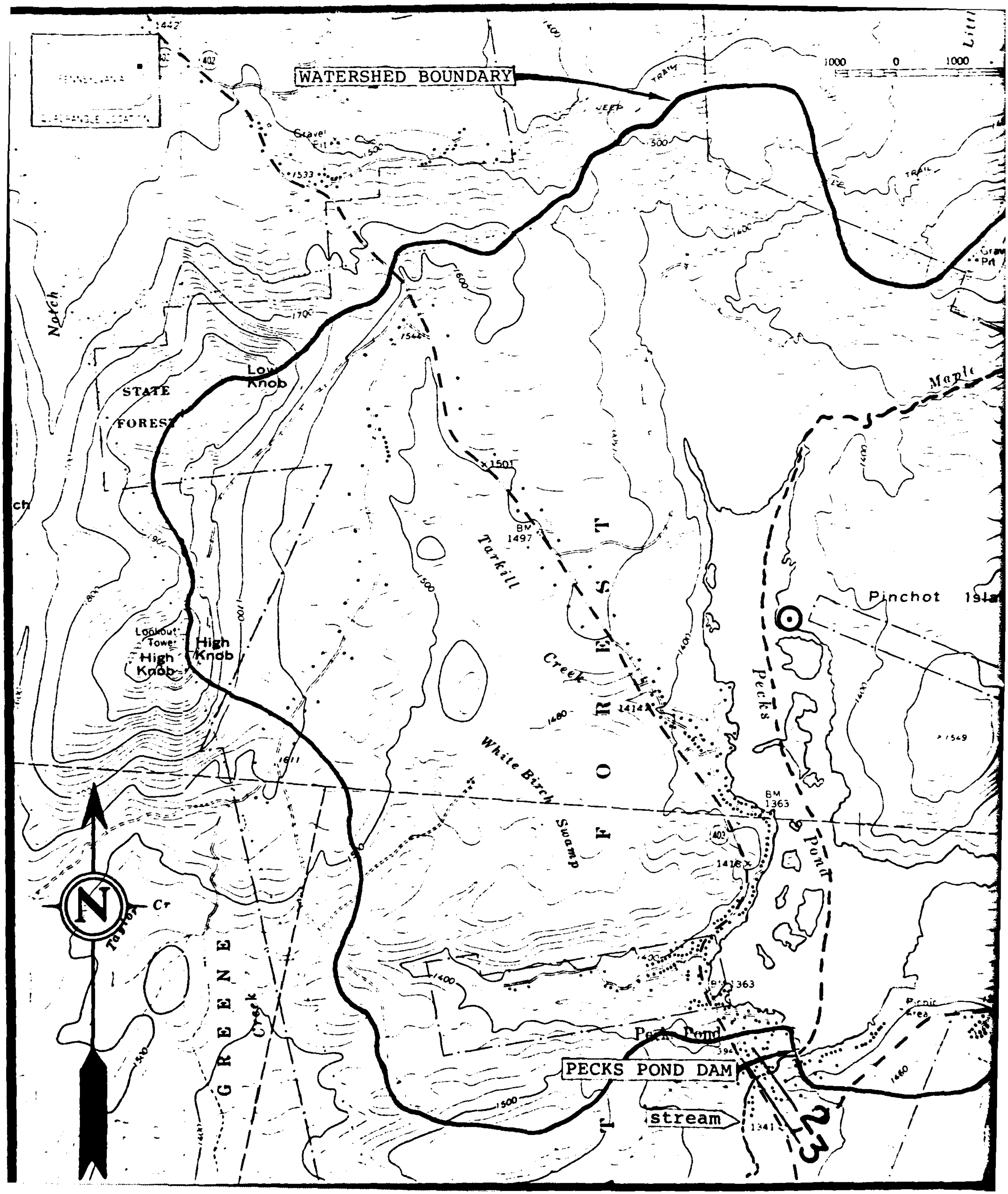
16. Water Resources Engineering, R. K. Linsley and J. B. Franzini, McGraw-Hill, Inc., New York, 1972.

17. Engineering for Dams, Volume 2, W. P. Creager, J. D. Justin, J. Hinds, John Wiley & Sons, Inc., New York, 1964.

APPENDIX E

FIGURES

LIST OF FIGURES


WATERSHED BOUNDARY
PECKS POND DAM
stream
Pecks Pond
Pinchot
Tarkill Creek
White Birch Swamp
STATE FOREST
Low Knob
High Knob
Lookout Tower
GREENE
FOREST
Notch
Gravel Pit
BM 1497
BM 1363
Peck Pond
Maple
Creek
Taylor Cr
N
1000 0 1000

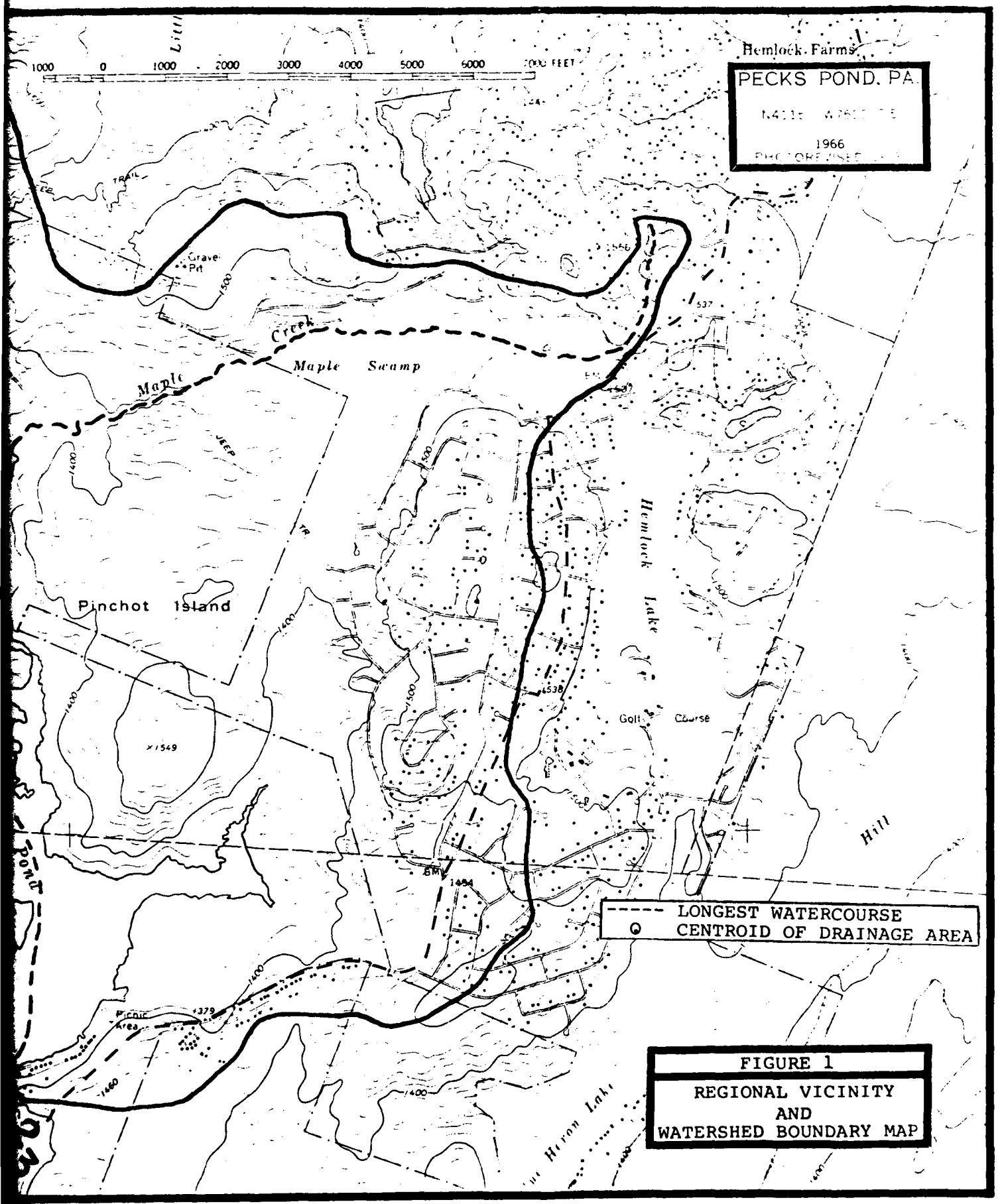
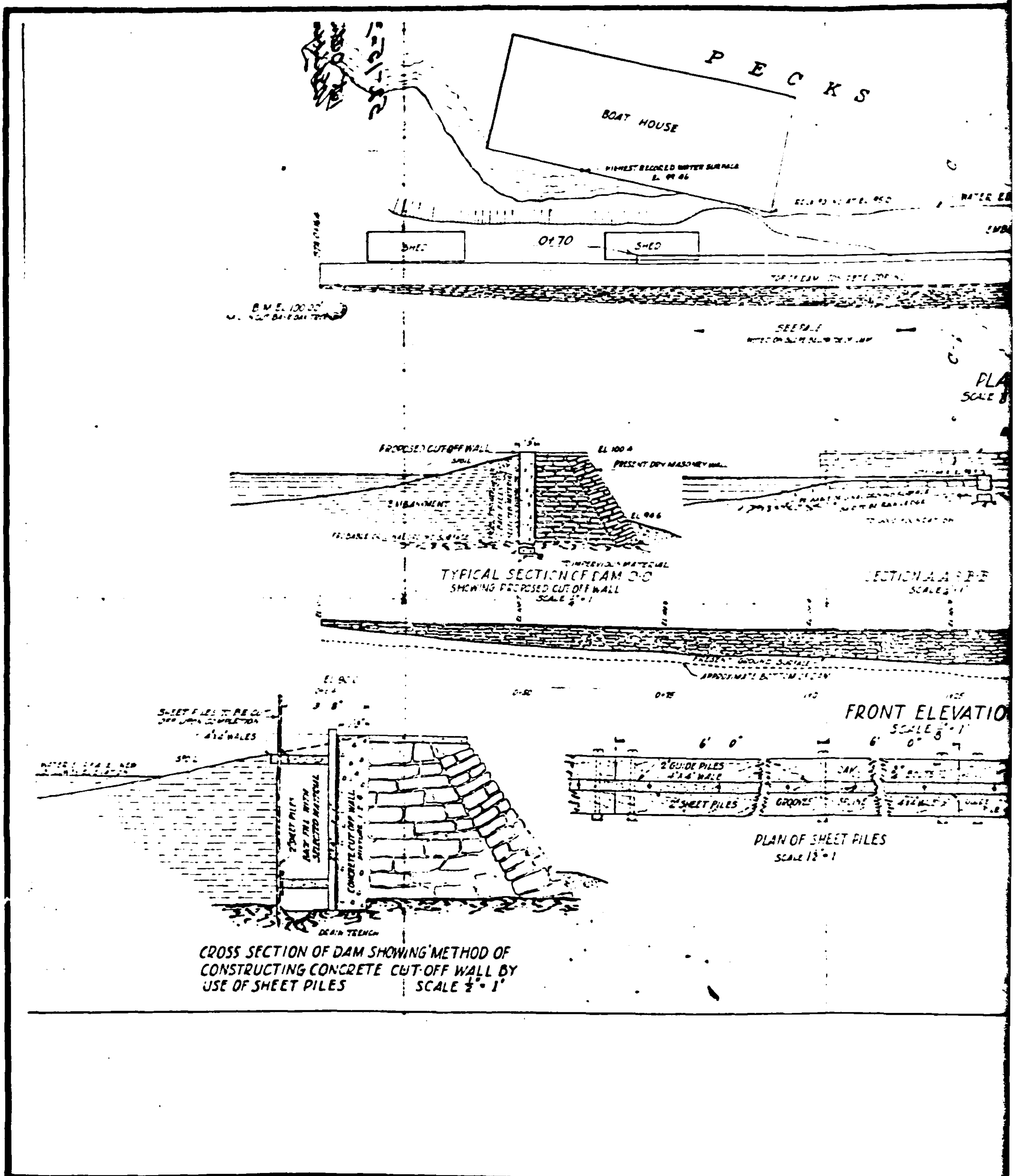


FIGURE 1

REGIONAL VICINITY AND WATERSHED BOUNDARY MAP


PECKS
BOAT HOUSE
SHED
SHED
0+70
B.M. EL 100.00
SEEPAGE
PROPOSED CUT-OFF WALL
EL 100.4
PRESENT DRY MASONRY WALL
EMBANKMENT
EL 94.6
IMPERVIOUS MATERIAL
TYPICAL SECTION OF DAM D-D
SHOWING PROPOSED CUT OFF WALL
FRONT ELEVATION
6' 0"
2" GUIDE PILES
4"x4" WALE
2" SHEET PILES
GROOVE
SPLINE
PLAN OF SHEET PILES
4"x4" WALES
SPOIL
CONCRETE CUT-OFF WALL
DRAIN TRENCH
CROSS SECTION OF DAM SHOWING METHOD OF
CONSTRUCTING CONCRETE CUT-OFF WALL BY
USE OF SHEET PILES
SCALE 1/2" = 1'

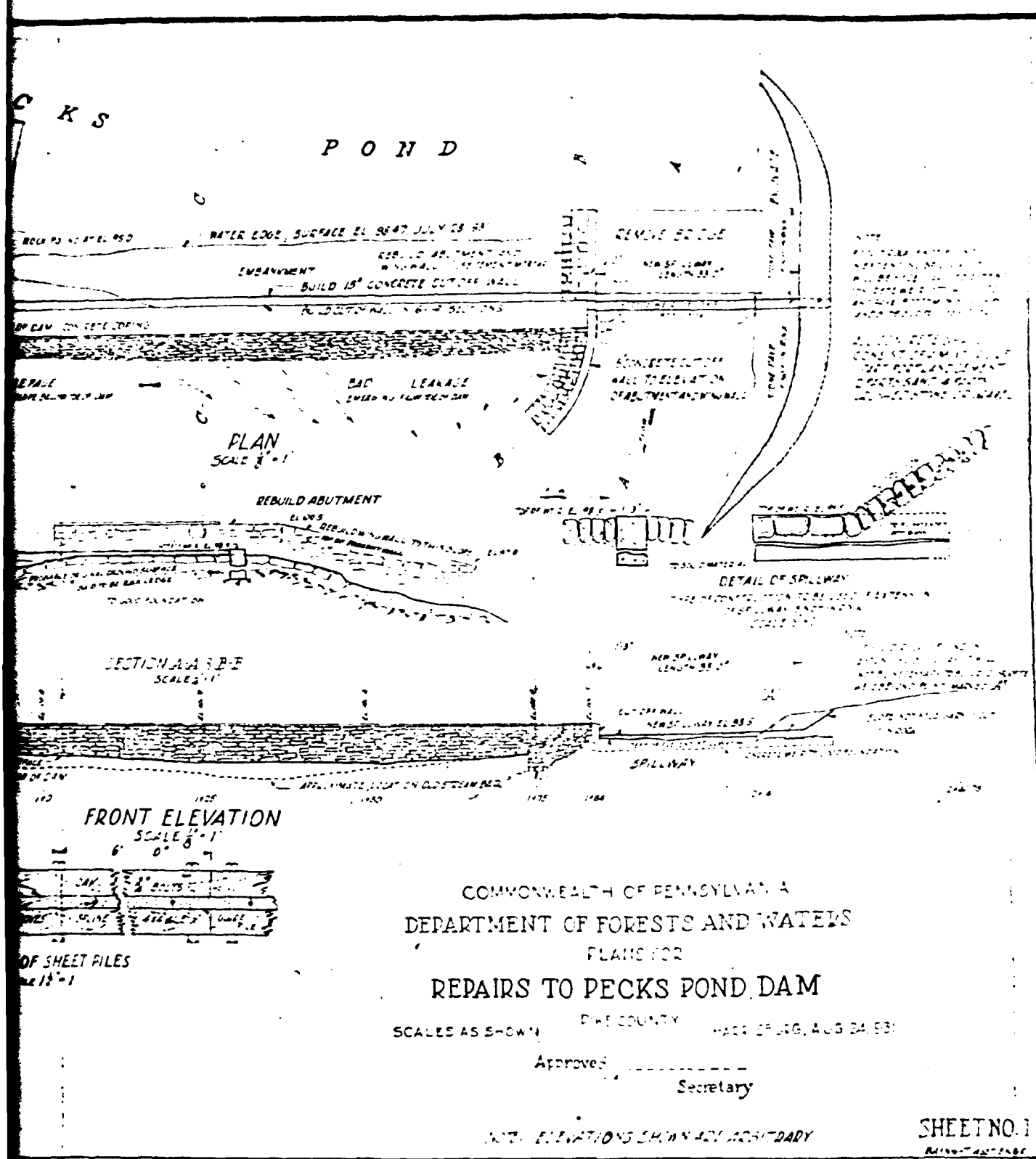


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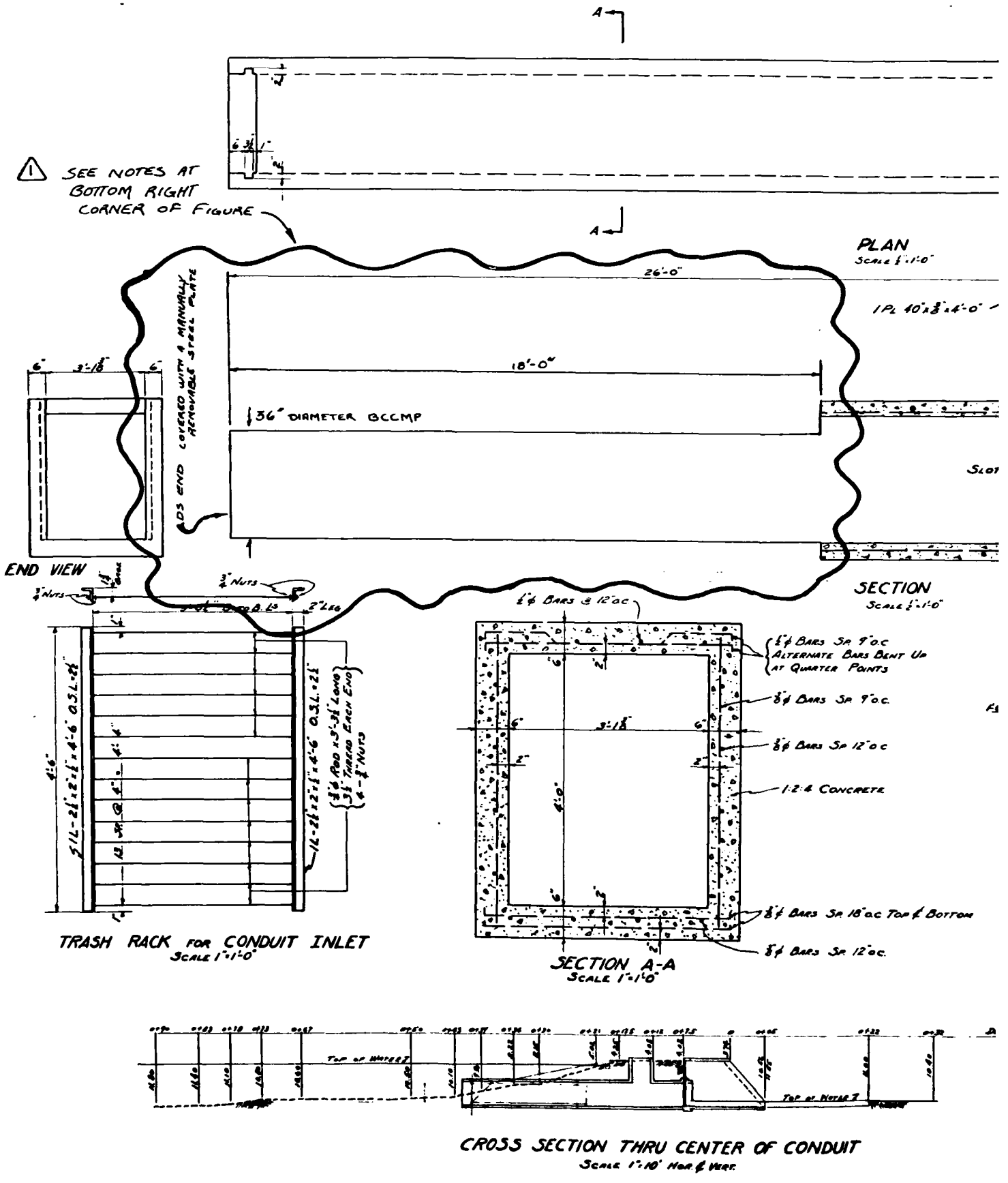
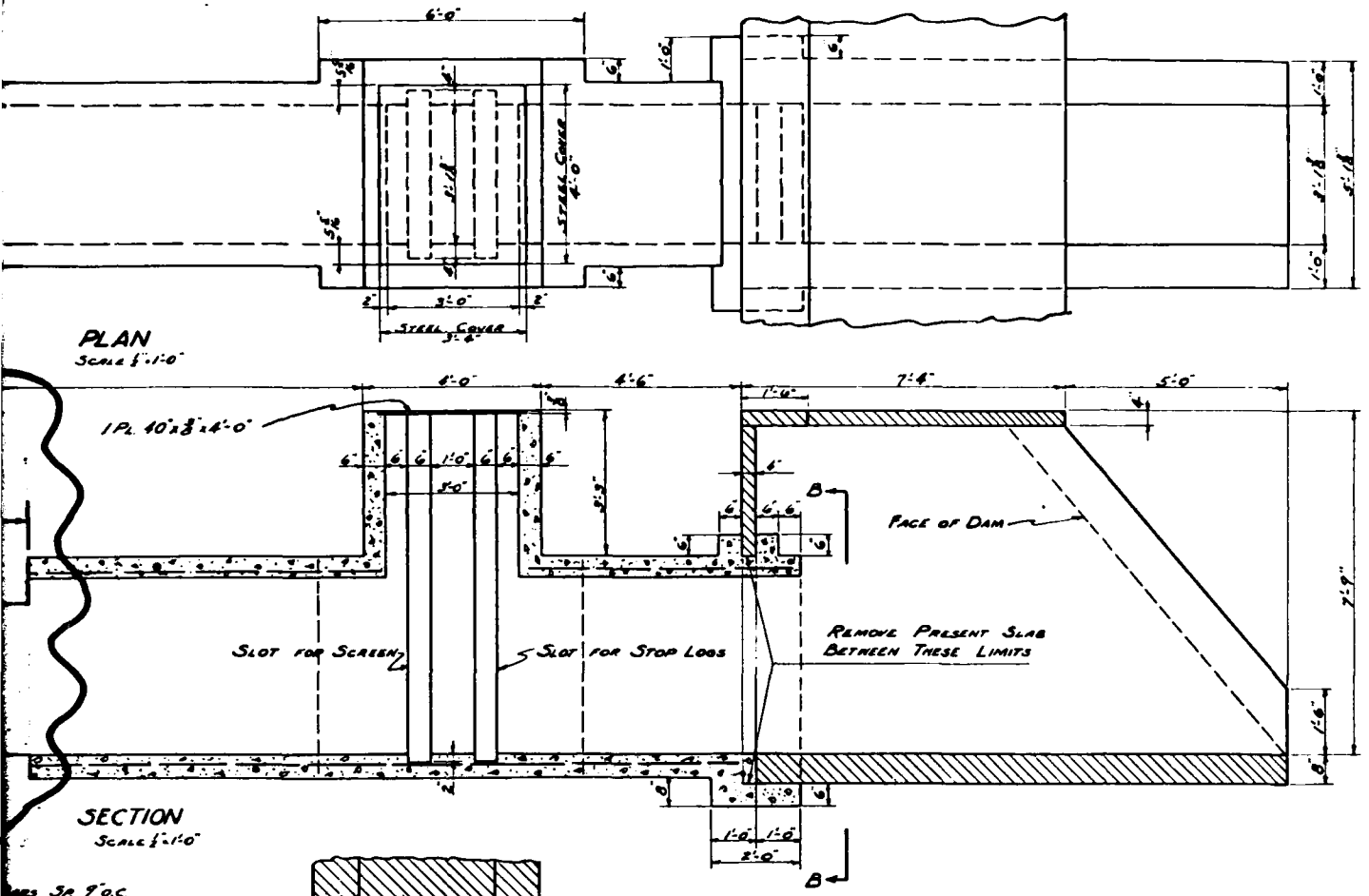
FIGURE 2


A
SEE NOTES AT BOTTOM RIGHT CORNER OF FIGURE
PLAN
Scale 1/4"=1'-0"
26'-0"
1 PL 10"x3/8"x4'-0"
18'-0"
36" DIAMETER BCCMP
DS END COVERED WITH A MANUALLY REMOVABLE STEEL PLATE
6"
3'-1 3/8"
6"
SLOT
END VIEW
3/4" Nuts
3/4" Nuts
2"Leg
SECTION
Scale 1/4"=1'-0"
5/L-2 1/2"x2 1/2"x4'-6" O.S.L.=21'
1/L-2 1/2"x2 1/2"x4'-6" O.S.L.=21'
3/4" ROD x 3'-3" LONG 3 1/2" THREAD EACH END 4-3/4" NUTS
4'-6"
TRASH RACK FOR CONDUIT INLET
Scale 1"=1'-0"
5/8" Bars @ 12" oc
5/8" Bars Sp 9" o.c
Alternate Bars Bent Up at Quarter Points
3/4" Bars Sp 9" o.c.
3/4" Bars Sp 12" o.c
1:2:4 Concrete
3/4" Bars Sp 18" oc Top & Bottom
3/4" Bars Sp 12" oc.
4'-0"
SECTION A-A
Scale 1"=1'-0"
Top of Water
Top of Notch
CROSS SECTION THRU CENTER OF CONDUIT
Scale 1"=10' Hor. & Vert.



PLAN
Scale 1/4"=1'-0"

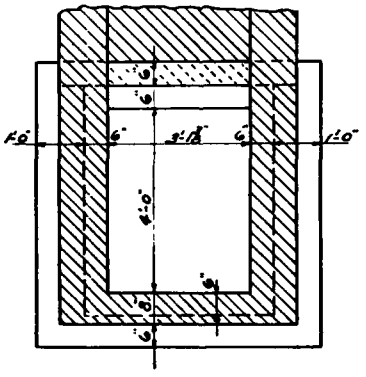
SECTION
Scale 1/4"=1'-0"

BARS 3A 9" O.C.
ALTERNATE BARS BENT UP
AT QUARTER POINTS

BARS 3A 9" O.C.

BARS 3A 12" O.C.

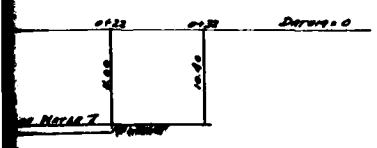
CONCRETE



SECTION B-B
Scale 1/4"=1'-0"
NOTE: CROSS HATCH IS PRESENT WALLS

BARS 3A 18" O.C. TOP & BOTTOM

BARS 3A 12" O.C.



CONDUIT

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF FORESTS & WATERS
HARRISBURG
GEORGE H. EARLE, GOVERNOR
JAMES F. BOGARDUS, SEC. OF FORESTS & WATERS

PIKE COUNTY — PORTER TWP.

PROPOSED OUTLET CONDUIT PECKS POND DAM

Designed By: C.K. Weigle	Traced By: S.G.H.	Date: 6-9-36
Drawn By: S.G.H.	Checked By:	Scale: As Noted
Approved: [signature] CHIEF ENGR. DR		File No. 52-15-4

⚠ Drawing contained in outlined area has been revised by GAI to reflect information gathered by the inspection team.

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FIGURE 3

APPENDIX F

GEOLOGY

Geology

Pecks Pond Dam is located in the glaciated Low Plateaus section of the Appalachian Plateaus physiographic province of eastern Pennsylvania. In this area, the Appalachian Plateaus province is characterized topographically by flat-topped, hummocky hills formed as a result of glaciation and subsequent stream dissection of nearly flat-lying strata. The Devonian age sedimentary rock strata in Pike County regionally strike N35°E and dip gently to the northwest. The Delaware River is the major drainage basin in the area. Major tributary streams intersect the Delaware River at right angles; whereas, smaller streams display a slightly more random tributary pattern. Both major and minor tributary stream systems are joint controlled and exhibit modified rectangular and trellis-type drainage patterns.

Structurally, the area containing Pike County lies on the south flank of a broad, asymmetrical synclinorium that plunges to the southwest. Superimposed on this broad structural basin are numerous anticlinal and synclinal folds characterized by planar limbs and narrow hinges. Due to prior glaciation, low relief and surficial soil cover, fold axes are difficult to trace.

The sedimentary rock sequences in the vicinity of the dam and reservoir are probably members of the Susquehanna Group of Upper Devonian age (see Geology Map). The sedimentological changes observed in the Catskill Formation indicate that the rate of sedimentation exceeded the rate of basin subsidence resulting in a facies change from marine to non-marine strata. On the accompanying geology map the delineation between the Middle and Upper Devonian age sedimentary rock sequences represents the Allegheny Front which separates the Valley and Ridge physiographic province from the Appalachian Plateaus physiographic province.

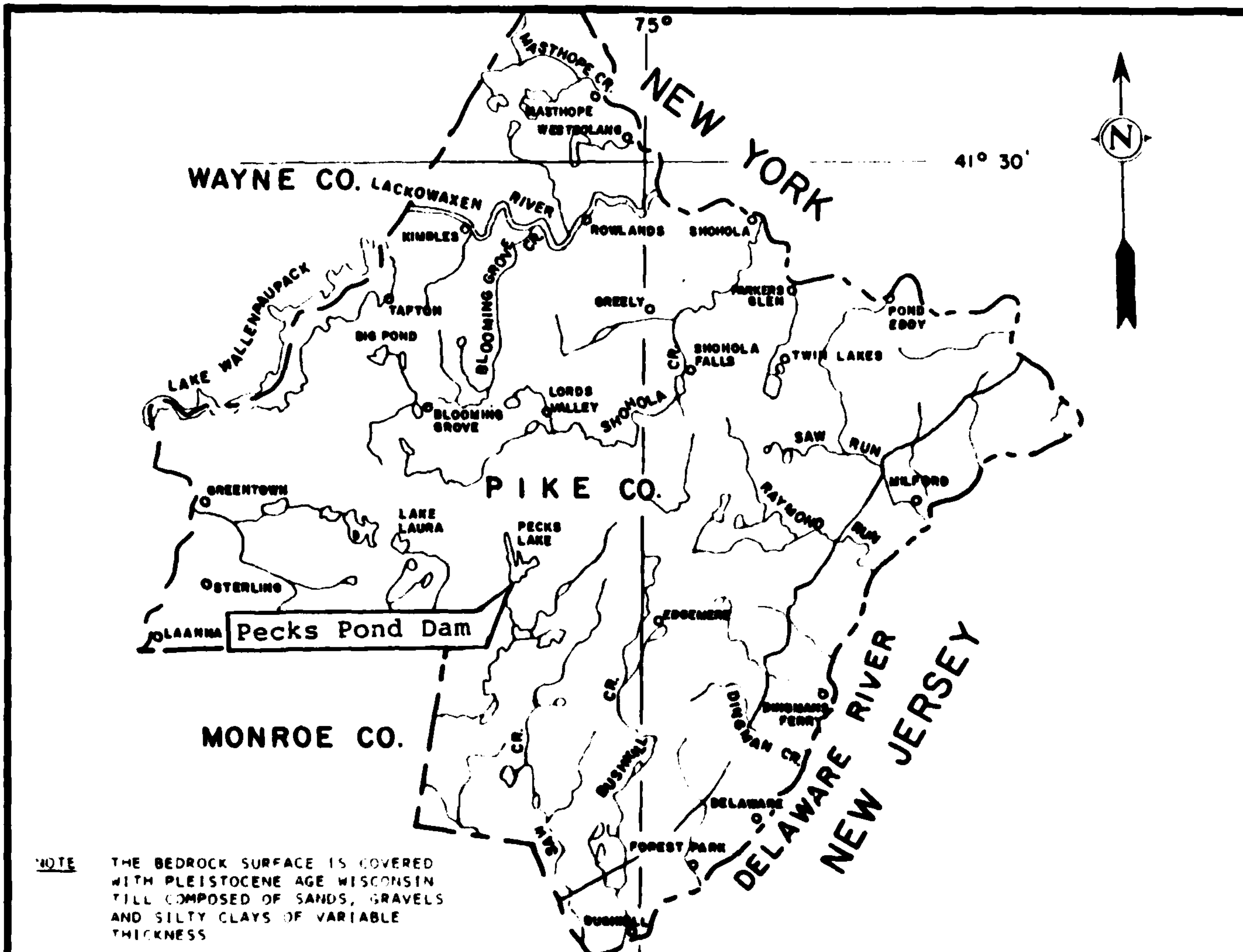
Approximately half of Pike County, including the dam site, is covered by a blanket of Wisconsin age (most recent) glacial drift which, based on the degree of weathering, was probably deposited during the Woodfordian stage. Valley bottoms are typically covered by recent alluvium and Woodfordian outwash of variable thickness, but typically less than 10 feet. These deposits are characteristically unconsolidated stratified sand and gravel usually with more gravel than sand and some small boulders. The direction of the Wisconsin ice advance, was from the northeast over the Catskill Mountains and from the north over the Appalachian Plateau. The terminal moraine resulting from the southern most advance of the Wisconsin ice sheet in this area is located in the southern portion of Monroe County which borders Pike County to the South.

References:

1. Fletcher, F. W., Woodrow, D. L., "Geology and Economic Resources of the Pennsylvania Portion of the Milford and Port Jervis 15 minute U.S.G.S. Topographic Quadrangles," Pennsylvania Geological Survey, Fourth Series, Harrisburg, Atlas 223, 1970.

2. Sevon, W. D., Berg, T. M., "Geology and Mineral Resources of the Skytop Quadrangle, Monroe and Pike Counties, Pennsylvania", Pennsylvania Geological Survey, Fourth Series, Harrisburg, Atlas 214A., 1978.

3. Sevon, W., Personal Communication, Commonwealth of Pennsylvania Department of Environmental Resources, Harrisburg, December 3, 1980.



NOTE THE BEDROCK SURFACE IS COVERED WITH PLEISTOCENE AGE WISCONSIN TILL COMPOSED OF SANDS, GRAVELS AND SILTY CLAYS OF VARIABLE THICKNESS

LEGEND

UPPER DEVONIAN — SUSQUEHANNA GROUP

Catskill Formation - [illegible] Member [illegible] red very fine to medium-grained sandstone [illegible] shale [illegible] sandstone and shale [illegible] Sandstones are predominantly [illegible] have simple or planar sets of small to medium-scale [illegible] with shale units are abruptly disconformable [illegible] thinly laminated and well cleaved [illegible] with sandstone units. Member is more than [illegible] feet thick. [illegible] at top of highest red bed of the underlying [illegible] Member [illegible] silty, massive, finely laminated well-cleaved shale [illegible] and silty very fine grained sandstone. [illegible] member is about 100 feet thick. Lower contact is gradational and [illegible] Delaware River Flags Member, grayish-green, massive, laminated [illegible] shale. Beds range from a few inches to [illegible] feet thick [illegible] contain no marine fossils. Member is about [illegible] feet thick. Lower contact [illegible]

MIDDLE DEVONIAN — HAMILTON GROUP

Mahantango Formation - Upper member medium dark gray, [illegible] silty shale; member is about [illegible] feet thick and is separated from lower member by the "[illegible]," a calcareous siltstone biostrome containing abundant [illegible]. The [illegible] lower member, virtually same lithology as upper member. Unit is about 1,[illegible] feet thick. [illegible] gradational.

Marcellus Shale - Dark-gray, evenly laminated, silty clay shale and clayey silt shale [illegible] contains very hard lime concretions and is well cleaved; bedding is generally obscured. Member is about 75-feet thick. Lower contact is gradational.

SCALE

0 — 6 — 12 — 18 MILES

REFERENCE:
GEOLOGIC MAP OF NORTHEASTERN PENNSYLVANIA. COMPILED BY GEO. W. STOSE AND O.A. LJUNGSTEDT COMMONWEALTH OF PENNSYLVANIA DEPT. OF INTERNAL AFFAIRS DATED 1932. SCALE 1" = 6 MILES.

GEOLOGY MAP

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